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STATE OF NEW YORK.

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No. 40.

IN SENATE,

APRIL 30, 1878.

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ANNUAL REPORT

OF THE

AMERICAN GEOGRAPHICAL SOCIETY FOR THE  
YEAR 1877.

No. 11 WEST 29TH STREET, }  
NEW YORK, March 25, 1878. }

Hon. WILLIAM DORSHEIMER,

*President of the Senate of the State of New York :*

SIR—In conformity with the provisions of the act incorporating this Society, I have the honor to transmit herewith the annual report of the American Geographical Society for the year 1877.

Very respectfully yours,

(Signed)

CHARLES P. DALY,

*President.*



## OFFICERS AND COUNCILLORS FOR THE YEAR 1877.

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### OFFICERS.

#### *President :*

CHIEF-JUSTICE DALY.

#### *Vice-Presidents :*

GEORGE W. CULLUM,      FREDERICK A. CONKLING,  
FRANCIS A. STOUT.

#### *Foreign Corresponding Secretary :*

CHARLES A. JOY.

#### *Domestic Corresponding Secretary :*

JAMES MÜHLENBERG BAILEY.

#### *Recording Secretary :*

ELIAL F. HALL.

#### *Treasurer :*

GEORGE CABOT WARD.

### COUNCILLORS.

|                    |                       |
|--------------------|-----------------------|
| WILLIAM REMSEN,    | ROSSELL D. HITCHCOCK, |
| T. BAILEY MYERS,   | ISAAC I. HAYES,       |
| W. H. H. MOORE,    | PAUL B. DU CHAILLU,   |
| WALTON W. EVANS,   | WM. H. MORRELL,       |
| ISAAC BERNHEIMER,  | J. CARSON BREVOORT,   |
| WILLIAM E. CURTIS, | LEVI P. MORTON,       |
| HARLOW M. HOYT,    | HENRY B. HAMMOND,     |
|                    | CLARENCE KING.        |



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ANNUAL REPORT  
OF THE  
AMERICAN GEOGRAPHICAL SOCIETY.

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*To the Honorable, the Legislature of the State of New York:*

In presenting the Annual Report of this Society, as required by the act of April 8, 1871, we beg leave to say that the charter, amended charter, organization, and general business, embracing a complete history of the Society's operations during 1877, will be found in the following pages.

[Signed.]

CHARLES P. DALY,

*President.*

ELIAL F. HALL,

*Recording Secretary.*

## CHARTER OF INCORPORATION.

GRANTED APRIL 13TH, 1854.

*The People of the State of New York, represented in Senate and Assembly, do enact as follows:*

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of The American Geographical and Statistical Society, for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and treasurer, and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or of the United States; which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

§ 5. The Legislature may, at any time, alter or repeal this act.

§ 6. This act to take effect immediately.

STATE OF NEW YORK, } ss.  
Secretary's Office.

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this thirteenth day of April, [L. S.] one thousand eight hundred and fifty-four.

A. G. JOHNSON,

*Deputy Secretary of State.*



# AMENDED CHARTER.

PASSED APRIL 8TH, 1871.

STATE OF NEW YORK,  
No. 237, IN SENATE, March 7th, 1871. }

Introduced, with unanimous consent, by Mr. Bradley; read twice, and referred to the Committee on Literature; reported favorably from said committee, and committed to the Committee of the Whole.

CHAP. 373.

AN ACT in relation to The American Geographical and Statistical Society.

PASSED April 8th, 1871.

*The People of the State of New York, represented in Senate and Assembly, do enact as follows:*

SECTION 1. The name or corporate title of the said Society shall hereafter be, The American Geographical Society of New York.

§ 2. The objects of the said Society shall be the advancement of geographical science; the collection, classification, and scientific arrangement of statistics, and their results; the encouragement of explorations for the more thorough knowledge of all parts of the North-American continent, and of other parts of the world which may be imperfectly known; the collection and diffusion of geographical, statistical, and scientific knowledge, by lectures, printed publications, or other means; the keeping-up of a correspondence with scientific and learned societies in every part of the world, for the collection and diffusion of information, and the interchange of books, charts, maps, public reports, documents and valuable publications; the permanent establishment in the city of New York of an institution in which shall be collected, classified, and arranged, geographical and scientific works, voyages and travels, maps, charts, globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate, and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive; and its geological history, giving its climatology, its productions, animal, vegetable, and mineral; its exploration, navigation, and commerce; having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses, in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income or its personal estate generally so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, } ss.  
Office of Secretary of State, }

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this twenty-second day [L. S.] of May, in the year one thousand eight hundred and seventy-one.

DIEDRICH WILLERS, JR.,  
Deputy Secretary of State.

# BY-LAWS.

## CHAPTER I.

### TITLE.

The title of the Society is, "The American Geographical Society."

## CHAPTER II.

### OBJECTS.

The objects of the Society are, "The collecting and diffusing of geographical and statistical information."

## CHAPTER III.

### MEMBERS.

1. The Society shall consist of fellows, honorary, corresponding and *ex-officio* members.

2. Honorary members shall be chosen on account of their distinction in the science of geography or statistics, and not more than twelve of them shall hereafter be elected in any one year.

3. Corresponding members shall be chosen from those who have aided the advancement of geography or statistics.

4. *Ex-officio* members shall be foreign diplomatic representatives and consuls resident in the United States; and United States diplomatic representatives and consuls in foreign countries.

5. Fellows, and corresponding, and honorary members shall be elected as follows: All nominations of candidates shall be openly made in writing at a meeting of the Society, or the Council, by a member thereof, and, together with the name of the member making them, entered on the minutes. The persons thus nominated, when approved by the Council and elected by the Society, shall, on payment of the initiation fee, if nominated as fellows, and without such payment if nominated as corresponding or honorary members, become members of the Society accordingly.

6. Persons entitled to become *ex-officio* members of the Society shall, on the recommendation of the Council, be, by the Society, constituted and declared to be such members.

7. The name of any member of the Society may, on the recommendation of the Council, and by a vote of two-thirds of the members present at a stated meeting of the Society, be dropped from the roll of its members.

## CHAPTER IV.

### INITIATION FEE AND ANNUAL DUES.

1. The initiation fee, including the dues for the current year, shall be, for a fellow, ten dollars, to be paid immediately on election.

2. The annual dues thereafter shall be, for a fellow, ten dollars, to be paid in advance.

3. Any fellow of the Society, not in arrears, may commute for life all dues for fellowship, by the payment at one time, if a fellow, of one hundred dollars.

4. The name of any fellow of the Society neglecting for two successive years to pay his annual dues, or at any time wholly refusing to pay them, may, by the Council, be erased from the list of fellows of the Society.

5. The fiscal year of the Society shall, for all purposes, be the calendar year, that is, commence on the first day of January, and end with the thirty-first day of December, in each year.

#### CHAPTER V.

##### OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, a treasurer, and fifteen councillors; and these together shall form the Council of the Society.

2. The officers and members of Council elected at the next annual election (except the president and treasurer), shall, at their first meeting, divide themselves into three classes, each to embrace one vice-president, one secretary, and five members of the Council, one of which classes shall hold office one year, one for two years, and another for three years, to be determined at said meeting by lot, or otherwise. The president and treasurer shall always be elected annually, and at each annual election thereafter there shall be elected a vice-president, secretary, and five members of Council, each for the term of three years.

3. All officers of the Society to be chosen at any election may be voted for on one ballot.

#### CHAPTER VI.

##### ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Tuesday after the first day of January in each and every year hereafter, when the annual election of the officers of the Society shall take place; and if, from any cause, there shall be a failure of the annual election at the time above designated for that purpose, the same may be held on the Tuesday next following—that is, on the third Tuesday after the first day of January in each year, and of which due notice shall be given.

2. Every member of the Society, who has been such for twenty days or more, and who is not in arrears for his dues, for the past year, shall be entitled to vote at the said election.

3. At the annual meeting of the Society, the Council shall present a general report of its proceedings, and of those of the Society during the past year; and the secretaries and treasurer shall also present their annual reports.

#### CHAPTER VII.

##### MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless otherwise specially ordered by the Society or the Council, shall hold its stated meetings for the transaction of business on the second Tuesday of each month of the year, except July, August and September.

2. The president, or, in his absence, one of the vice-presidents may, and, upon the written request of five members, shall, call a special meeting of the Society, by giving three days' notice thereof in two daily newspapers published in the city of New York.

#### CHAPTER VIII.

##### ORDER OF BUSINESS.

1. At all stated meetings of the Society for the transaction of ordinary business, the order of proceedings shall be as follows:

1. Reading of the Minutes.
2. Reports and Communications from officers of the Society.
3. Reports from the Council.
4. Reports from Committees.

## 5. Nominations of Members.

## 6. Special Orders.

## 7. Unfinished Business.

## 8. Miscellaneous Business.

## 9. Papers read and Addresses delivered before the Society.

2. All propositions presented for the action of the Society, at any of its meetings, shall be in writing, when requested by the presiding officer, or any member. A proposition, thus presented, when seconded, and the question thereon stated from the chair, shall be deemed to be in the possession of the Society, and open for discussion; but may be withdrawn by the mover, at any time before amendment or decision.

3. No member shall speak more than once upon the same question until all the other members present, desiring to speak, shall have spoken; nor more than twice on any question without leave of the Society.

## CHAPTER IX.

## QUORUM.

At all meetings of the Society, nine members present shall constitute a quorum for the transaction of business.

## CHAPTER X.

## COMMITTEES.

All committees, authorized by the Society, shall, unless otherwise specially ordered, consist of three members each, and be appointed by the presiding officer.

## CHAPTER XI.

## PRESIDING OFFICER.

At all meetings of the Society, on the arrival of the appointed hour, and the presence of a quorum, the president, or, in his absence, one of the vice-presidents, or, in the absence of both, a chairman *pro tem.*, shall immediately take the chair, call the meeting to order, and preside. He shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. He shall, also, unless otherwise specially ordered, appoint all committees authorized by the Society; and, at every annual election, before the opening of the polls, he shall appoint two tellers of the election.

## CHAPTER XII.

## SECRETARIES.

1. Foreign Corresponding Secretary.—It shall be the duty of the foreign corresponding secretary to conduct the general correspondence of the Society with individuals and associate bodies in foreign countries.

2. Domestic Corresponding Secretary.—It shall be the duty of the domestic corresponding secretary to conduct the Society's general correspondence with individuals and associate bodies in the United States.

3. Both the foreign and domestic secretaries shall keep, in suitable books to be provided for that purpose, at the Society's rooms, true copies of all letters written by them respectively on behalf of the Society; and shall preserve, on proper files, at the said rooms, all letters received by them on the same account; and at each stated meeting of the Society or the Council, they shall respectively report their correspondence, and read the same, or such parts thereof as may be required.

4. In case of a vacancy in the office of either of the corresponding secretaries, or in the absence or disability of either of these officers, the duties of both may be performed by the other corresponding secretary.

5. The Society may designate a particular officer, or appoint a committee to prepare a letter or letters on any special occasion.

6. Recording Secretary.—It shall be the duty of the recording secretary to give due notice of the time and place of all meetings of the Society, and to attend the same. He shall keep fair and accurate minutes of the proceedings of the Society, and record the same, when approved, in the Society's Journal. He shall give immediate notice to the several officers and committees of the Society, of all votes, orders, resolves, and proceedings of the Society, affecting them, or appertaining to their respective duties. He shall prepare a list of the members of the Society entitled to vote, to be handed to the tellers before the opening of the polls at each annual election. He shall officially sign and affix the corporate seal of the Society to all diplomas, and other instruments or documents authorized by the Society or Council. He shall have charge of the corporate seal, charter, by-laws, records, and general archives of the Society, except so far as they may be expressly placed under the charge of others. He shall certify all acts and proceedings of the Society, and shall notify the Council of the death, resignation, or removal of any officer or member of the Society. He shall have charge of the rooms of the Society, and shall perform all such other and further duties as may, from time to time, be devolved upon him by the Society or the Council. He, together with the Council, shall have the charge and arrangement of the books, maps, and collections belonging to the Society. He shall cause to be kept in the rooms of the Society, a registry of all donations to the library or collections of the Society, acknowledge their receipt by letter to the donors, and report the same, in writing, to the Society at its next stated meeting.

7. All documents relating to the Society, and under the charge of the secretaries respectively, shall be placed in such depositories in the rooms of the Society as the Council may provide and designate for that purpose.

### CHAPTER XIII.

#### TREASURER.

The treasurer shall have charge of, and safely keep, all contracts, certificates of stock, securities, and muniments of title belonging to the Society. He shall collect the dues and keep the funds of the Society, and disburse the same under the direction of the Council; and so often as the said funds in the hands of the treasurer shall amount to one hundred dollars, he shall deposit the same, in the name of the Society, in some incorporated bank in the city of New York, to be designated for that purpose by the Council; and the said funds, thus deposited, shall be drawn out of the said bank on the check of the treasurer, countersigned by the chairman of the Council, and only for the legitimate and authorized purposes of the Society. The treasurer shall, previous to the annual meeting of the Society, prepare and submit to the Council, for audit, a detailed account of his receipts and disbursements for account of the Society during the past year; and which annual account, duly audited, he shall present, with his general report, to the Society at its annual meeting.

### CHAPTER XIV.

#### COUNCIL.

1. The Council shall have the management and control of the affairs, property, and funds of the Society, and shall designate an incorporated bank in the city of New York, where the said funds shall, from time to time as they accrue, be deposited by the treasurer.

2. It may frame its own by-laws not inconsistent with the charter or by-laws of the Society.

3. It shall appoint the necessary agents, clerks, and servants of the Society, with such powers and duties, privileges and compensation, as it may, from time to time, determine; and may, at pleasure, revoke such appointments, and make others in their stead.

4. It shall have power to fill, for the unexpired term, any vacancy that may occur in any of the offices of the Society.

5. It shall have power, at its discretion, to declare vacant the seat of any member of its own body (except the president and vice-presidents) who shall have been absent from its meetings for three successive months; and, also, by a vote of a majority of the whole Council, to remove, from its own body, any member thereof for cause; but in such case it shall be the duty of the Council to report every such vacancy or removal to the Society, at its next stated meeting thereafter, when such cases shall be subject to review by the Society.

6. It shall not, without an approving vote of the Society, at a stated meeting thereof, make any contract whereby a liability in amount above one thousand dollars may be incurred by the Society; nor, without such vote, make any sale or disposition of the property of the Society, exceeding that sum in value.

7. The Council may, in its discretion, remit the initiation fee, or annual dues, of any member of the Society.

8. No member of the Council shall receive any salary or pecuniary compensation for his services.

9. The Council shall hold stated meetings for the transaction of business, at least once in every month, except the months of July, August, and September.

10. At all meetings of the Council, five members present shall constitute a quorum for the transaction of business.

#### CHAPTER XV.

##### GENERAL PROVISION AS TO DEBT.

No debt on account of the Society, beyond the funds in the treasury for its payment, shall, for any purpose, at any time, be incurred; and if, at any time, it shall appear that there are resting upon the Society pecuniary obligations beyond the funds in the treasury for their liquidation, no appropriation of funds from the treasury whatever, except for the necessary current expenses of the Society, shall be made, until the said pecuniary obligations shall be fully discharged, or the funds necessary for their extinction shall have been set apart for that purpose.

#### CHAPTER XVI.

##### ALTERATION OF THE BY-LAWS.

No alteration in the by-laws of the Society shall be made unless openly proposed at a stated meeting of the Society, entered on the minutes, with the name of the member proposing the same, and adopted by the Society at a subsequent stated meeting, by a vote of two-thirds of the members present.

#### CHAPTER XVII.

##### ADOPTION OF THE BY-LAWS.

The foregoing are hereby adopted and declared to be the by-laws of the Society; and all by-laws of the Society heretofore adopted are hereby rescinded and declared to be null and void.



## HONORARY AND CORRESPONDING MEMBERS, AND FELLOWS.

### HONORARY MEMBERS.

- BAKER, Sir Samuel White, Pasha. F. R. S., F. R. G. S., London, England.  
 CONSTANTINE, H. I. H., the Grand Duke, President of the Imperial Russian Geographical Society, St. Petersburg.  
 DUFFERIN, Right Honorable Frederick Temple Hamilton, Blackwood, Earl of, K. P., G. C. M. G., K. C. B., F. R. S., Governor-General of Canada, Ottawa.  
 ISMAIL, Pasha, H. H., the Khedive of Egypt, Cairo.  
 LAYARD, Austin Henry, D. C. L., London, England.  
 MARKHAM, Clements R., K. C. B., Secretary Royal Geographical Society, London, England.  
 MCCLINTOCK, Francis Leopold, LL. D., London, England.  
 MIDDENDORFF, Adolph Theodore von, Secretary of the Imperial Academy of Sciences of Russia, St. Petersburg.  
 PETERMANN, Professor Augustus, Ph. D., Gotha.  
 RAWLINSON, Major-General Sir Henry C., K. C. B., Vice-President Royal Geographical Society, London.  
 STRUBE, Professor Otto Wilhelm von, St. Petersburg.  
 WILCZEK, Count H., Vienna.

### CORRESPONDING MEMBERS.

- |   |   |
|---|---|
| ASEJORSEN, P. C., Christiania, Sweden.                    | BECKER, M. A., Vienna.                                |
| ABBE, Prof. Cleveland, Cincinnati, Ohio.                  | BEHM, Dr. E., Gotha.                                  |
| ALVORD, General Benjamin, U. S. Army, Washington, D. C.   | BRAINE, Commander D. L., U. S. N., Washington, D. C.  |
| ARSENIW, Georges, St. Petersburg.                         | BRIGHT, John, M. P., London.                          |
| ALTAMIRANO, Señor Don Ignacio, Mexico.                    | BUSHNELL, Rev. Albert, Gaboon, Equatorial Africa.     |
| AMMEN, Rear Admiral Daniel, U. S. Navy, Washington, D. C. | CHAIX, Prof. Paul, Geneva.                            |
| BAKER, Commodore F. H., U. S. Navy, Norfolk, Va.          | CHANDLES, W., F. R. G. S., London.                    |
| BARANDA, Señor Joaquin, Mexico.                           | COLLINS, Lieut. Frederick, U. S. Navy, Annapolis, Md. |
| BARCLAY, James T., M. D., Jerusalem, Syria.               | CHAMBERS, William, Edinburgh, Scotland.               |
| BARNARD, Henry, LL. D., Hartford, Conn.                   | DEHAAS, Rev. F. S.                                    |
| BARTLETT, John Russell, Providence, R. I.                 | DAVIS, Thomas E., Rome.                               |
| BORGES, Carvalho.   | DRAPER, Lyman, Madison, Wis.                          |
| —, Brazilian Minister, Washington, D. C.                  | FOETTERLE, Franz, Vienna.                             |
| BLACKIE, Walter G., Ph. D., F. R. G. S., Glasgow.         | FRITSCH, Hugo O., New York.                           |
| BOTASSI, Demitri, Consul-General of Greece, New York.     | GARDNER, Prof. James T., New York.                    |
| BASTIAN, Dr. Adolph, Berlin.                              | GILMAN, Prof. Daniel Coit, LL. D., Baltimore, Md.     |
|   | GUYOT, Prof. Arnold Henry, LL. D., Princeton, N. J.   |
|   | HAGUE, J. D., New York.                               |

- HANCOCK, Prof. Wm. Neilson, LL. D., Dublin.  
 HAYDEN, Prof. F. V., Washington, D. C.  
 HELLWALD, Friedrich von, Vienna.  
 HITCHCOCK, Prof. C. H., Ph. D., Hanover, N. H.  
 HOCHSTETTER, Dr. Ferdinand von, Vienna.  
 HOSMER, Dr. George, New York.  
 HOUGH, Franklin B., M. D., Washington, D. C.  
 HUMPHREYS, General A. A., U. S. Army, Washington, D. C.  
 HUNT, Prof. T. Sterry, LL. D., Boston.  
 JOHNSTON, W. E., Paris.  
 JACKSON, John P., Berlin.  
 LACROZE, Julius C. E., Buenos Ayres.  
 LAMANSKY, Eugene von, St. Petersburg.  
 LESSEPS, Ferdinand de, Suez, Egypt.  
 LUCE, Capt. S. B., U. S. Navy, Newport, R. I.  
 LONG, Col. C. C.  
 MCCARTEE, Divie Bethune, M. D., Hong Kong, China.  
 MALTE-BRUN, V. A., Honorary Secretary of the Geographical Society, Paris.  
 MARISCAL, Señor Don Ignacio, Mexico.  
 MARSH, Hon. George P., LL. D., Rome.  
 MARTIN, Rev. Wm. P., President Imperial College, Peking, China.  
 MAWRY, Louis Ferdinand Alfred, Paris.  
 MAUVOIR, Charles, Paris.  
 MORGAN, Lewis H.  
 MELLO, Dr. T. G. M. Homein de, Rio Janeiro.  
 MORGAN, Henry James, Ottawa, Canada.  
 NABSTEK, Vojta, Prague, Austria.  
 NASSAU, Rev. R. A., Gaboon, Equatorial Africa.  
 NEGRI, Christoforo, Hamburgh, Germany.  
 NEWMARCH, William, Honorary Secretary Statistical Society of London.  
 NORDENSKJÖLD, Prof. A. E., Stockholm.  
 ORTIZ, Señor Don Manuel, Seo.  
 PASSMORE, Frank B., C. E., New Zealand.  
 ISMAIL, Pacha, Governor General of the Soudan.  
 POESCHE, Theodore, Washington, D. C.  
 PERALTA, Señor Don Manuel M., Min. Res. Costa Rica, Washington, D. C.  
 RETIRO, Viscount Bom. President Historical and Geographical Society, Rio Janeiro.  
 RIMONDI, Antonio, Peru.  
 RAE, John, M. D., Hamilton, Canada.  
 RAYMOND, Capt. Charles W., U. S. Army, West Point, N. Y.  
 ROBERTS, Gen. W. M., New York.  
 ROMERO, Mathias, Mexico.  
 ROGERS, Rear Admiral John, U. S. Navy.  
 ROTHROCK, J. T. M. D., Wilkesbarre, Pa.  
 ROHLFS, Gerhard, M. D.  
 SEGURO, Viscount Porto, Minister of Brazil, at Vienna.  
 STONE, Gen. Charles P., Cairo, Egypt.  
 SAINT-MARTIN, Vivien de, Paris.  
 SAPUCAHY, M. Le Visconte, Rio Janeiro, Brazil.  
 SCHLAGINTWEIT-SAKUNLUNSKI, Robert von, Giessen, Germany.  
 SCHLAGINTWEIT-SAKUNLUNSKI, Herm'n von.  
 SCHUMACHER, Herman A., M. D., Consul-General, German Empire, New York.  
 SCHUMACHER, John, Altona, Germany.  
 SCHUYLER, Eugene, St. Petersburg.  
 SELFIDGE, Commander T. O., U. S. Navy, Washington, D. C.  
 SEYMOUR, Horatio, LL. D., Utica, N. Y.  
 STANLEY, Henry M.  
 STARRING, Gen. F. A., Paris.  
 STEVENS, Henry, London.  
 STEERE, J. B., Hong Kong, China.  
 TAINTOR, Edward G., Shanghai, China.  
 VAN BENTHUYSEN, Charles, Albany, N. Y.  
 VAN CAMPEN, Samuel Richard, London.  
 WALKER, Gen. Francis A., New Haven, Conn.  
 WHEELER, Lieut. G. M., U. S. Army, Washington, D. C.  
 WILLIAMS, S. Wells, LL. D., New Haven, Conn.  
 WYMAN, Capt. R. H., U. S. Navy, Washington, D. C.  
 YOUNG, Jess, F. R. G. S., Wisbeach, England.

## FELLOWS.

## Date of election.

- 1853 Alsop, Joseph W.  
 1860 Acton, Thomas C.  
 1868 Appleton, William H.  
 1869 Auchmuty, Richard Tylden.  
 1859 Arnoux, William H.  
 1859 Arnold, David H. (L. F.)  
 1859 Aymar, William. (L. F.)  
 1871 Atterbury, Rev. Wm. Wallace, D. D.  
 1872 Allen, Horatio M.  
 1873 Albert, Halpern.  
 1874 Ascher, Adolph.  
 1874 Adler, Felix, M. D.

## Date of election.

- 1874 Adams, Rev. Wm., D. D.  
 1874 Agnew, John T. (L. F.)  
 1874 Arnold, Richard.  
 1874 Allen, Henry Wilder.  
 1874 Alexander, Junius B.  
 1874 Alexander, Charles B.  
 1874 Abbott, James L.  
 1874 Arthur, Gen. Chester A.  
 1874 Auferman, August.  
 1874 Auchincloss, Henry B.  
 1874 Acker, David D.  
 1874 Avery, Samuel P.



## Date of election.

1874 Amend, Bernhard G.  
 1874 Agnew, Alexander McL.  
 1874 Adams, Charles Francis.  
 1874 Astor, W. W.  
 1874 Appleton, George S.  
 1874 Appleton, John A.  
 1874 Appleton, D. S.  
 1874 Adams, John P.  
 1874 Anderson, Henry H.  
 1874 Anthony, Edward.  
 1874 Alsop, William.  
 1874 Amy, Henry.  
 1874 Andrews, George H.  
 1875 Anthony, Henry F.  
 1875 Alexander, William.  
 1875 Alexander, J. W.  
 1875 Amsnick, Gustav.  
 1875 Allen, Wm. M.  
 1876 Andrews, Wm. L.  
 1876 Amory, Copley  
 1876 Appleton, Nathan.  
  
 1852 Bancroft, George. (L. F.)  
 1852 Barney, Hiram. (L. F.)  
 1853 Brown, James M.  
 1853 Butler, Charles.  
 1856 Baker, Francis. (L. F.)  
 1856 Berry, Richard.  
 1856 Brevoort, J. Carson.  
 1856 Brown, Stewart.  
 1859 Brown, James. (L. F.)  
 1859 Boorman, J. M.  
 1859 Boardman, Andrew.  
 1859 Bernheimer, Isaac.  
 1859 Belmont, August. (L. F.)  
 1859 Barlow, S. L. M.  
 1860 Benedict, Erastus C.  
 1861 Butterfield, Gen. Daniel.  
 1865 Banvard, John.  
 1865 Bellows, Rev. Henry W.  
 1868 Banks, David.  
 1868 Beardslee, Rufus G.  
 1868 Beckwith, N. M.  
 1868 Bennett, James Gordon.  
 1868 Bernheimer, Adolph.  
 1868 Bernheimer, Simon.  
 1868 Bill, Edward.  
 1868 Blake, Charles F.  
 1868 Brady, John R.  
 1869 Bailey, Jas. Muhlenberg.  
 1869 Banyer, Goldsboro.  
 1869 Bickmore, Prof. A. S.  
 1869 Bierstadt, Albert.  
 1869 Bloomfield, William.  
 1870 Butler, Cyrus.  
 1870 Brooks, Sidney.  
 1870 Botta, Prof. Vincenzo.  
 1870 Body, John E.  
 1870 Bishop, T. Alston. (L. F.)  
 1870 Bell, George.  
 1871 Butler, Benjamin F.  
 1872 Bryce, James. (L. F.)  
 1872 Brown, Walston H.  
 1873 Blood, O. Howard.  
 1873 Bailey, N. P.

## Date of election.

1874 Bishop, D. W. (L. F.)  
 1874 Bien, Julius.  
 1874 Booth, Rev. Robert R.  
 1874 Beecher, Rev. Henry Ward.  
 1874 Bartlett, Willard.  
 1874 Birdseye, Lucien.  
 1874 Bryant, Wm. Cullen.  
 1874 Bissinger, Philip.  
 1874 Barney, Newcomb C.  
 1874 Backus, Henry C.  
 1874 Ballin, Eugene S.  
 1874 Baker, James, Jr.  
 1874 Beardslee, J. B.  
 1874 Boesé, Charles.  
 1874 Baldwin, Townsend B.  
 1874 Bates, Levi M.  
 1874 Barnes, John S.  
 1874 Barbour, Thomas.  
 1874 Bonner, Robert.  
 1874 Betts, William.  
 1874 Bonn, William B.  
 1874 Bjerring, Rev. Nicolas.  
 1874 Barnard, Horace.  
 1874 Barnard, F. A. P.  
 1874 Benjamin, John.  
 1874 Bell, Isaac.  
 1874 Butler, Wm. Allen.  
 1874 Bartow, Morey H.  
 1874 Barling, Henry A.  
 1874 Bard, Charles.  
 1874 Barr, William.  
 1874 Bacharach, Herman.  
 1874 Belding, Milo M.  
 1874 Beach, Wm. A.  
 1874 Buckley, Rev. Jas. M.  
 1874 Bookstaver, Henry W.  
 1874 Brown, Charles S.  
 1874 Brownson, Lieut. W. H., U. S. N.  
 1875 Barney, Charles T.  
 1875 Bancroft, Benjamin F.  
 1875 Beach, Miles.  
 1875 Beaman, Charles C., Jr.  
 1875 Balch, George T.  
 1875 Bernheimer, J. A.  
 1875 Belknap, Robert Lenox.  
 1875 Beckwith, Leonard F.  
 1875 Benjamin, E. B.  
 1875 Bull, Charles S., M. D.  
 1875 Bixby, Lieut. Wm. H., U. S. A.  
 1875 Brewerton, Gen. Henry, U. S. A.  
 1875 Beekman, Gerard.  
 1875 Babcock, Gen. O. E., U. S. A.  
 1875 Benkard, James.  
 1875 Brownell, Silas B.  
 1875 Bergland, Lieut. Eric, U. S. A.  
 1875 Burgess, William J.  
 1875 Brown, Vernon H.  
 1875 Barnes, William.  
 1875 Barney, A. H.  
 1875 Bliss, George.  
 1875 Beste, Henry.  
 1875 Bredt, Ernest.  
 1875 Bonner, John.  
 1875 Buckley, Charles E.  
 1875 Bernacki, Charles, M. D.

## Date of election.

1875 Bent, Captain Silas.  
 1875 Bigelow, John.  
 1875 Bedle, Joseph D.  
 1875 Belknap, Capt. George E., U. S. N.  
 1875 Bowie, Augustus J., Jr.  
 1876 Buechner, Augustus.  
 1876 Bowne, Richard H.  
 1876 Burnett, Henry L.  
 1876 Buell, James.  
 1876 Blunt, George W. (L. F.)  
 1876 Breese, Jas. Lawrence  
 1876 Banks, James L., M. D.  
 1876 Baldwin, Com'r Charles H., U. S. N.  
 1876 Bodisco, Waldemer de.  
 1876 Brower, John.  
 1876 Billings, Frederick.  
 1876 Bellew, F. H. T.  
 1877 Booth, George.  
 1877 Bixby, Robert F.  
 1877 Börs, Christian.  
 1877 Briggs, Prof. Charles A.  
 1877 Beall, J. A.  
 1877 Blanchard, George R.  
 1877 Barbour, John M.  
 1877 Blatchford, Eliphalet W.

1852 Colton, Joseph H. (L. F.)  
 1855 Conkling, Frederick A. (L. F.)  
 1855 Cooper, Peter.  
 1856 Cooley, James E. (L. F.)  
 1856 Carter, Robert.  
 1856 Colgate, Charles C.  
 1856 Cooper, Edward.  
 1856 Crooks, Ramsay.  
 1856 Curtis, William E.  
 1862 Cowdin, Eliot C.  
 1863 Cary, William F. (L. F.)  
 1868 Catlin, N. W. Stuyvesant, (L. F.)  
 1868 Cisco, John J.  
 1868 Choate, William G.  
 1868 Chapman, Joseph H.  
 1869 Cullum, Gen. G. W., U. S. A. (L. F.)  
 1869 Churchill, Franklin H.  
 1874 Cruickshank, James.  
 1870 Conklin, William A.  
 1872 Corse, Israel.  
 1872 Conklin, Eugene E.  
 1872 Crawford, Gen. S. W., U. S. Army.  
 1872 Clark, E. V.  
 1872 Cox, Samuel S.  
 1873 Coster, Charles H.  
 1874 Connery, T. B.  
 1874 Cowdrey, N. A.  
 1874 Curphey, James.  
 1874 Cushing, Caleb.  
 1874 Case, Robert L.  
 1874 Campbell, Allan.  
 1874 Church, George E.  
 1874 Chauncey, Henry.  
 1874 Christern, F. W.  
 1874 Courtright, Milton.  
 1874 Cockcroft, Jacob H. V.  
 1874 Chickering, Charles F.  
 1874 Comstock, Cornelius.  
 1874 Constable, James M.

## Date of election.

1874 Ceballos, J. M.  
 1874 Cable, George W.  
 1874 Carter, Walter S.  
 1874 Caswell, Wm. H.  
 1874 Chatfield, Cyrus H.  
 1874 Crerar, John.  
 1874 Crocker, David.  
 1874 Cruickshank, Edwin A.  
 1874 Crosby, J. Schuyler.  
 1874 Clerke, Wm. B.  
 1874 Clark, Lot Curran,  
 1874 Chauncey, Frederick.  
 1874 Coates, Isaac T., M. D.  
 1874 Cochrane, Lieut. H. Clay, U. S. M. C.  
 1874 Colgate, James B.  
 1874 Constantine, Andrew J.  
 1874 Constantine, John.  
 1874 Corning, Erastus.  
 1874 Cottenet, Francis.  
 1874 Cossitt, Frederick H.  
 1874 Cogswell, Wm. L.  
 1874 Coutan, Charles E.  
 1874 Conyngham, Wm. L.  
 1874 Crosby, Hiram B.  
 1874 Crocker, George A.  
 1874 Crocker, Wm. Baylies.  
 1874 Chickering, George H.  
 1874 Carter, Oliver S.  
 1874 Carhart, Thomas F.  
 1874 Catlin, Julius Jr.  
 1874 Cabot, Stephen.  
 1874 Caylus, Ernest.  
 1874 Colgate, Robert.  
 1874 Curren, Robert.  
 1874 Cowles, Walter S.  
 1875 Clendenin, J. W.  
 1875 Cameron, R. W.  
 1875 Chandler, Prof. C. F.  
 1875 Cushman, W. F.  
 1875 Cornwall, N. Ellsworth.  
 1875 Colgate, Bowles.  
 1875 Cooper, George C.  
 1875 Champlin, John D., Jr.  
 1875 Cassebeer, Henry A., Jr.  
 1875 Clark, A. Hyatt.  
 1875 Chalmers, George.  
 1875 Childs, Calvin G.  
 1875 Clarke, W. W.  
 1875 Cone, James B.  
 1875 Cameron, Prof. J. G. M.  
 1875 Chittenden, S. B., Jr.  
 1875 Cannon, S. Townsend.  
 1876 Clarke, W. H.  
 1876 Cullum, Mrs. George W. (L. F.)  
 1876 Constable, Major A. G.  
 1876 Church, John A.  
 1876 Cornell, John B.  
 1876 Curtis, Benjamin L.  
 1876 Curtis, Benjamin R.  
 1877 Cromwell, Charles T.  
 1877 Crosby, F. L.  
 1855 Daly, Chief-Justice Charles P.  
 1855 Dunshee, Prof. Henry W.  
 1856 Duncan, Wm. Butler.

## Date of election.

1856 Douglass, Andrew E.  
 1856 Dodge, Wm. E.  
 1856 Dodge, Wm. E., Jr.  
 1856 Detmold, William, M. D.  
 1859 Dickerson, E. N.  
 1864 Detmold, Christian E.  
 1866 Darling, Wm. A.  
 1868 Dwight, Prof. Theo. W.  
 1868 Duyckinck, Evert A.  
 1868 Du Chaillu, Paul B.  
 1868 Dennis, Charles. (L. F.)  
 1868 Davies, Henry E.  
 1870 Dash, John B.  
 1870 Davis, Alexander J.  
 1870 Drown, Henry F.  
 1870 Dinsmore, William B.  
 1871 Daly, Joseph F.  
 1873 De Peyster, Frederick. (L. F.)  
 1873 Delano, Franklin H.  
 1873 Dwight, James F.  
 1874 De Peyster, Gen. J. Watts. (L. F.)  
 1874 Diefendorf, Menzo.  
 1874 Davis, Noah.  
 1874 Dillon, Romaine. (L. F.)  
 1874 Dutilh, E.  
 1874 Downer, Samuel.  
 1874 Decker, Charles A.  
 1874 Delafield, M. L.  
 1874 Dix, General John A.  
 1874 Dana, Charles A.  
 1874 Daly, Augustin.  
 1874 Draper, Frank E.  
 1874 Denny, Thomas.  
 1874 Devlin, Jeremiah.  
 1874 Davidson, Stratford P.  
 1874 Donohue, Charles.  
 1874 Decker, John J.  
 1874 Del Monte, Leonardo.  
 1874 Deyo, R. E.  
 1874 Du Bois, Wm. A.  
 1874 Dowd, William.  
 1874 De Castro, Diego.  
 1874 Delmonico, L.  
 1874 Davis, Samuel D.  
 1874 Davis, John G.  
 1874 Davis, John H.  
 1874 Dalrymple, Alexander.  
 1874 Driggs, Marshall S.  
 1874 Duke, John H.  
 1874 Dunscomb, Richard T.  
 1874 Dun, R. G.  
 1874 Defendorf, Wilson.  
 1874 Dane, Major H. C.  
 1875 Darrow, William.  
 1875 Davies, Julien T.  
 1875 Du Bois, Eugene.  
 1875 Donnelly, John J.  
 1875 Daniel, Edwin M.  
 1875 Dodd, Josiah F.  
 1875 Davison, Charles A.  
 1875 Dodge, Charles C.  
 1875 De Peyster, Frederic J.  
 1875 Delafield, Lewis L.  
 1875 Dommerick, L. F.  
 1875 Dudley, Henry.

## Date of election.

1875 De Camp, Wm. Scott.  
 1876 Drake, Simeon I.  
 1876 Dawson, A. H. H.  
 1876 Davis, Admiral C. H., U. S. N.  
 1876 Davis, Gilbert F.  
 1876 Day, Lieut. Murray S., U. S. N.  
 1876 Drexel, Joseph W.  
 1876 Dawson, B. F., M. D.  
 1877 Day, Henry M.  
 1877 Drennan, Prof. M. J.  
 1877 Davis, Joseph Beale. (L. F.)  
 1877 Dorsheimer, William.  
  
 1853 Eyre, Henry S. P.  
 1859 Evarts, William M.  
 1864 Evans, Walton W.  
 1868 Emmet, Thomas Addis, M. D.  
 1872 Edwards, Jonathan.  
 1873 Ellinger, Moritz.  
 1874 Ernst, C. W.  
 1874 Endicott, Francis.  
 1874 Eaton, Dorman B.  
 1874 Eaton, John.  
 1874 Eidlitz, Marc.  
 1874 Eaton, D. Cady.  
 1874 Ewen, John, Jr.  
 1874 Eaton, Sherburne B.  
 1874 Egleston, Henry P.  
 1875 Eldridge, Titus B.  
 1875 Esterbrook, Richard, Jr.  
 1875 Ellis, John W.  
 1875 Elliott, John.  
 1875 Eimer, Charles.  
 1875 Ely, Richard S.  
 1875 Eads, Captain James B., C. E.  
 1876 Ellers, George Howard.  
 1877 Elderkin, John.  
  
 1854 Field, Cyrus W. (L. F.)  
 1857 Fish, Hamilton.  
 1856 Field, David Dudley.  
 1856 Field, B. H. (L. F.)  
 1856 Fernbach, Henry.  
 1859 Fogg, Wm. H. (L. F.)  
 1860 Field, Rev. H. M.  
 1864 Faile, Thomas H.  
 1868 Frohwein, Theobald.  
 1869 Furniss, William.  
 1869 Forsyth, Rev. John.  
 1869 Field, Dudley.  
 1871 Fliess, Wm. M.  
 1873 Freedman, John J.  
 1873 Fithian, Freeman J.  
 1874 Farragut, Loyall.  
 1874 Foshay, James W.  
 1874 Fabbri, Egisto P.  
 1874 Fargo, William G.  
 1874 Fisk, Harvey.  
 1874 Foster, J. P. Girard.  
 1874 Fellows, John P.  
 1874 Ferry, George J.  
 1874 Foulke, Joseph.  
 1874 Francklyn, C. G.  
 1874 Fleet, Oliver S.  
 1874 Fatman, Lewis.

## Date of election.

1874 Fabbri, Ernesto G.  
 1874 Foster, Wm. R.  
 1874 Forman, Alexander.  
 1874 Fox, Baldwin N.  
 1874 Frothingham, Rev. O. B.  
 1874 Fougere, Edmund C.  
 1874 Frame, Charles P.  
 1874 Fox, Austen G.  
 1875 Foulke, Thomas.  
 1875 Faile, Charles V.  
 1875 Fargo, James C.  
 1875 Fuller, Charles D.  
 1875 Farquhar, Col. Francis A., U. S. A.  
 1875 Froebel, Prof. Charles.  
 1875 Fay, Richard S.  
 1875 Forster, Robert.  
 1875 Fraser, Edward A.  
 1875 Ford, James B.  
 1875 Foote, Emerson.  
 1875 Fay, A. Goodrich.  
 1875 Folsom, George W.  
 1876 Fisk, Gen. Clinton B.  
 1877 Fiske, Andrew.  
 1877 Flagg, Wm. J.  
 1877 Ferris, L. Murray, Jr.

1856 Greenwood, Isaac J.  
 1856 Guernsey, Egbert, M. D.  
 1857 Greene, John W., M. D. (L. F.)  
 1859 Griswold, George. (L. F.)  
 1860 Graham, James L. (L. F.)  
 1868 Gambrell, C. D.  
 1868 Gebhard, Wm. H. (L. F.)  
 1868 Gerry, Elbridge. (L. F.)  
 1868 Goldsmith, Jacob.  
 1868 Green, Andrew H.  
 1868 Greene, Gen. G. S.  
 1869 Gilbert, Clinton.  
 1870 Graham, Gen. C. K.  
 1871 Gilman, Wm. C.  
 1872 Gerard, James W.  
 1872 Godon, Rear Admiral S. W., U. S. N.  
 1872 Grinnell, R. M.  
 1873 Gillmore, Gen. Q. A., U. S. A.  
 1873 Gedney, Frederick G.  
 1873 Glaubenslee, Theo. G.  
 1874 Greenebaum, David S.  
 1874 Gardner, Hugh.  
 1874 Green, John.  
 1874 Gunther, Wm. Henry.  
 1874 Gunther, F. F.  
 1874 Garland, John R.  
 1874 Gitterman, Henry.  
 1874 Gilbert, Fred. E.  
 1874 Gibbs, Theodore K.  
 1874 Gleason, Wesley.  
 1874 Gottsberger, Wm. S.  
 1874 Goodsell, James H.  
 1874 Gomez, Raphael M.  
 1874 Gray, Horace.  
 1874 Galpen, Horace.  
 1874 Gabb, Wm. M.  
 1875 Grosvenor, James B.  
 1875 Greene, Lieut. F. V., U. S. A.  
 1875 Gregory, Capt. James F., U. S. A.

## Date of election.

1875 Gordon, Robert.  
 1875 Germond, Wellington.  
 1875 Gross, Michael C.  
 1875 Greene, G. S. Jr., C. E.  
 1875 Garrison, Cornelius K.  
 1875 Gibson, James.  
 1875 Goepp, Charles.  
 1876 Gautier, Dudley G.  
 1876 Gerson, Julius.  
 1877 Green, Lieut. Com. F. M., U. S. N.  
 1877 Gaylord, Augustus.  
 1877 Guleke, H. F., M. D.

1856 Hewitt, Abram S.  
 1856 Hunt, Wilson G.  
 1856 Herring, Silas C.  
 1858 Holton, David P., M. D. (L. F.)  
 1859 Henderson, John C.  
 1859 Havemeyer, John C. (L. F.)  
 1864 Hammond, Henry B.  
 1868 Huntington, Daniel.  
 1868 Hurlbert, Wm. H.  
 1868 Hoyt, David.  
 1868 Hoppin, Wm. Jones.  
 1868 Hoguet, Robert J.  
 1868 Hall, Elial F.  
 1868 Harris, Townsend. (L. F.)  
 1868 Hartt, Prof. Ch. Fred.  
 1868 Hayes, Isaac I., M. D.  
 1868 Hadden, John A. (L. F.)  
 1868 Hallock, Mrs. Frances.  
 1869 Halsted, Wm. M.  
 1869 Hutchins, Waldo.  
 1870 Hawkes, Prof. W. Wright.  
 1870 Havens, Charles G.  
 1870 Harrison, Prof. Thomas F.  
 1871 Hamilton, Alexander, Jr.  
 1871 Hand, Clifford A.  
 1872 Hoffman, Wm. B.  
 1872 Hamersley, John W. (L. F.)  
 1872 Hawkins, Dexter A.  
 1872 Holbrook, Levi.  
 1873 Havemeyer, Theo. A.  
 1874 Hamersley, A. Gordon. (L. F.)  
 1874 Hamersley, Louis C. (L. F.)  
 1874 Hancock, Gen. Winfield S., U. S. A.  
 1874 Hay, John.  
 1874 Haldeman, S. S.  
 1874 Hitchcock, Rev. Roswell D.  
 1874 Havemeyer, Hector C.  
 1874 Hoguet, Henry L.  
 1874 Hoyt, Oliver.  
 1874 Hurlbert, Henry A. (L. F.)  
 1874 Hutton, Benjamin H.  
 1874 Haydock, George G.  
 1874 Haines, John P.  
 1874 Hinton, John H., M. D.  
 1874 Hendricks, M. M.  
 1874 Hawk, Samuel.  
 1874 Hallgarten, Adolphus.  
 1874 Havemeyer, James.  
 1874 Holbrook, E. F.  
 1874 Hoe, Richard M.  
 1874 Harbeck, John H.  
 1874 Hascall, Wm. S.

## Date of election.

1874 Harper, Nathan.  
 1874 Hunter, John W.  
 1874 Hunter, Charles F.  
 1874 Hendricks, Edmund.  
 1874 Hendricks, Joshua.  
 1874 Hawes, James W.  
 1874 Hampton, Elwood.  
 1874 Hatch, Rufus.  
 1874 Huntington, C. P.  
 1874 Hunter, Lieut. Edward.  
 1874 Hoyt, Harlow M.  
 1874 Haight, Charles C.  
 1875 Hubbard, Prof. O. P.  
 1875 Hensel, M.  
 1875 Howard, Thomas T., Jr.  
 1875 Hall, Rev. Randall C.  
 1875 Hammond, Wm. A., M. D.  
 1875 Houston, Col. D. C., U. S. A.  
 1875 Heuer, Capt. Wm. H., U. S. A.  
 1875 Hoxie, Lieut. Richard L., U. S. A.  
 1875 Howell, Major Charles W., U. S. A.  
 1875 Howley, John C.  
 1875 Hughes, Wm. H. T.  
 1875 Hoppenstedt, G. L.  
 1875 Heins, Wm. F.  
 1875 Herpich, Charles A.  
 1875 Hodgskin, James B.  
 1875 Hanemann, John F.  
 1875 Howes, Leander T.  
 1875 Howland, Meredith.  
 1875 Hyde, Henry B.  
 1875 Harper, P. J. A.  
 1875 Hazen, Gen. W. B., U. S. A.  
 1875 Harris, Siegmund.  
 1875 Hun, Leonard G.  
 1876 Heminway, Albert G.  
 1876 Holt, Henry.  
 1876 Hallock, Henry W.  
 1876 Halsted, Major Geo. B.  
 1876 Higgins, A. Foster.  
 1876 Hoare, W. Robert.  
 1876 Holman, Frank E.  
 1876 Hill, Frank A.  
 1876 Hyde, Samuel N.  
 1876 Hoes, Wm. M.  
 1876 Holden, Daniel J.  
 1876 Hatfield, J. B. T.  
 1877 Houghton, Prof. Walter R.

1859 Ireland, John B.  
 1874 Isaacs, Isaac S.  
 1874 Iselin, Wm. E.  
 1874 Ives, Fred'k E.  
 1874 Iselin, Adrian, Jr.  
 1875 Ingraham, David P.

1852 Jay, John. (L. F.)  
 1852 Jones, John D. (L. F.)  
 1868 Johnson, Henry W.  
 1868 Johnson, Hezron A.  
 1868 Joy, Prof. Charles A.  
 1868 Jacob, Ephraim A.  
 1870 James, Fred'k P.  
 1871 Jones, Walter R. T.  
 1873 Jackson, James, Jr.

## Date of election.

1874 Judson, Wm. D.  
 1874 Janssen, Gerhard.  
 1874 Jesup, M. K.  
 1874 Jaffray, Edward S.  
 1874 Jenkins, Wm. L.  
 1874 James, D. Willis.  
 1874 Jameson Joseph A.  
 1874 Jordan, Conrad N.  
 1874 Jones, George.  
 1874 Jaffray, Robert.  
 1875 Jones, Ed. Renshaw.  
 1876 Johnston, James W.  
 1876 Johnson, Rossiter.  
 1876 Jones, John M.  
 1877 Jones, J. Weyman.

1852 Kingsland, A. C.  
 1854 Kennedy, Robert Lenox.  
 1868 Kirkland, Charles P.  
 1869 Kelly, Eugene.  
 1870 Kane, J. Grenville.  
 1872 Kendrick, Col. H. L., U. S. A.  
 1872 Klamroth, Albert.  
 1873 Kennan, George.  
 1874 King, Edward.  
 1874 Kearney, Joseph R.  
 1874 Kunhardt, Henry R.  
 1874 Kingsland, Wm. M.  
 1874 Kidder, Henry P.  
 1874 Kalbfleisch, Charles H.  
 1874 Knoedler, Julius.  
 1874 Keck, Thomas.  
 1874 Kemp, Wm.  
 1874 Keese, Samuel T.  
 1874 Kaufman, Samuel.  
 1874 Kayser, Julius.  
 1874 Kitching, Robert N.  
 1874 Knower, John.  
 1874 Kemp, John H.  
 1874 King, David, Jr.  
 1874 King, Lewis.  
 1875 Knapp, Herman, M. D.  
 1875 Kiernan, Lawrence D.  
 1876 Kobbé, Herman.  
 1876 Knauth, Percival.  
 1876 Koonz, P. J., M. D.  
 1876 Kent, Andrew W.  
 1877 King, Clarence.  
 1877 Kane, Gen. Thomas L.  
 1877 Kiddoo, Gen. J. B.

1852 Livingston, Cambridge. (L. F.)  
 1856 Lanier, J. F. D.  
 1857, Low, A. A.  
 1859 Lenox, James.  
 1859 Lathers, Richard. (L. F.)  
 1862 Lambert, E. W., M. D.  
 1868 Leslie, Frank.  
 1868 Lawrence, Abraham R.  
 1868 Lane, Smith E.  
 1869 Lawrence, John S. (L. F.)  
 1870 Loew, Fred'k W.  
 1870 Lyman, Edward H. R.  
 1871 Letson, Robert S.  
 1871 Larremore, Richard L.

## Date of election.

1871 Lee, Ambrose.  
 1872 Libbey, Wm. (L. F.)  
 1873 Lydig, David.  
 1873 Latting, John J.  
 1874 Lathrop, F. S. (L. F.)  
 1874 Lauterbach, Edward.  
 1874 Lyall, John H.  
 1874 Leary, Arthur.  
 1874 Livingston, Robert J. (L. F.)  
 1874 Littell, Eugene  
 1874 Langdon, Walter. (L. F.)  
 1874 Lorillard, Peter.  
 1874 Lord, George W. T.  
 1874 Lord, G. De Forest.  
 1874 Lorillard, George L.  
 1874 Longstreet, Charles A.  
 1874 Leavenworth, E. W.  
 1874 Lockwood, B.  
 1874 Livingston, John A.  
 1874 Livingston, Robert E.  
 1874 Littlejohn, James.  
 1874 Lawton, Walter E.  
 1874 Lawrence, Jos. B.  
 1874 Leggett, Francis W.  
 1874 Le Comte, Joseph.  
 1874 Lederle, Joseph.  
 1874 Lewis, Walter A.  
 1874 Lane, George W.  
 1874 Lawrence, Samuel B.  
 1874 Lawrence, Alexander C.  
 1874 Lawrence, Effingham N.  
 1874 Leuthner, Frederick.  
 1874 Leshner, Stephen R.  
 1875 Luff, George.  
 1875 Low, Seth.  
 1875 Lawrence, George N.  
 1875 Ludlow, Major Wm., U. S. A.  
 1875 Lowrey, James P.  
 1875 Lancey, Robert C.  
 1875 Lienau, Louis A.  
 1875 Luling, Charles.  
 1875 Low, Josiah O.  
 1875 Little, James.  
 1876 Lamborn, Robert H.  
 1876 Low, A. Augustus.  
 1876 Lindau, Leopold.  
 1877 Lockwood, Le Grand.  
 1877 Landesman, John.  
 1877 Lindley, John.  
 1877 Latrobe, John H. B.

1852 Myers, Col. T. Bailey.  
 1853 Moore, George H. (L. F.)  
 1856 Morgan, E. D.  
 1856 Monroe, Ebenezer.  
 1856 Manners, David S.  
 1859 McMullen, John.  
 1859 Morrell, Wm. H. (L. F.)  
 1859 Moore, Frank. (L. F.)  
 1863 Marshall, Charles H.  
 1863 May, Lewis.  
 1863 Moore, W. H. H. (L. F.)  
 1864 Morton, Levi P.  
 1865 Morgan, Wm. D.  
 1866 Morris, Robert R.

## Date of election.

1868 Murphy, Thomas.  
 1868 Murphy, Henry C.  
 1868 Morrison, Henry.  
 1868 Moreau, John B.  
 1868 Montgomery, A. G., Jr.  
 1868 Mitchell, Grove P.  
 1868 Miller, Edmund H.  
 1868 Martin, Isaac P.  
 1868 M rquand, Henry G.  
 1868 Marsh, Luther R.  
 1868 MacKellar, Wm.  
 1868 McLean, James M.  
 1868 McClure, George.  
 1869 Mount, Richard E. (L. F.)  
 1869 Moore, Henderson.  
 1870 Morris, Harry M.  
 1870 Marbury, Francis F.  
 1870 Myers, Alfred G.  
 1870 Myer, Gen. A. J., U. S. A. (L. F.)  
 1870 Murray, D. Colden.  
 1870 Miles, Edward D.  
 1871 Maclay, Robert.  
 1872 Meyer, F. William.  
 1872 Matthews, Edward. (L. F.)  
 1872 Marié, Peter. (L. F.)  
 1872 Meeker, H. G.  
 1873 Moore, C. B.  
 1874 Morris, Henry L.  
 1874 Mailer, W. H.  
 1874 Macy, Wm. H.  
 1874 Marble, Mantion.  
 1874 McAlpine, Wm. J., C.E.  
 1874 Myers, John K.  
 1874 Morrison, Edward.  
 1874 Morgan, W. F.  
 1874 Menken, J. Stanwood.  
 1874 Montgomery, Thos. H.  
 1874 Miller, Philip S.  
 1874 McElligott, Henry R.  
 1874 Mott, Alexander B., M. D.  
 1874 Moir, James.  
 1874 Morgan, J. Pierpont.  
 1874 Maclay, Isaac W.  
 1874 Myers, John K., Jr.  
 1874 Martin, John M.  
 1874 Marks, Joseph H.  
 1874 McAlpin, David H.  
 1874 Merrill, Wm. J.  
 1874 McMahon, Gen. M. T.  
 1874 Moulton, Clarence F.  
 1874 McCurdy, Robert H.  
 1874 Miller, Geo. Macculloch.  
 1875 Martin, George C.  
 1875 Marshall, F. Pelham.  
 1875 Mitchell, Edward.  
 1875 Macy, Arthur.  
 1875 Morgan, Rev. John B., D. D.  
 1875 McFarland, Major Walter, U. S. A.  
 1875 Marcus, Arnold.  
 1875 Meyer, Theo. F. H.  
 1875 Mott, Henry A., Jr.  
 1875 Michler, Gen. Nathaniel, U. S. A.  
 1875 Motley, James M.  
 1875 Meeker, Wm. B.  
 1875 Monheimer, Joseph A.



## Date of election.

1875 Magoun, George C.  
 1875 Montague, Col. G. L.  
 1875 Magnus, Carl.  
 1875 MacLay, Moses B.  
 1875 Marsland, George.  
 1875 Merritt, M. F.  
 1875 Martin, Bradley.  
 1875 Meyer, L. H.  
 1875 McLanahan, Geo. William.  
 1875 Mass, F. M.  
 1876 Mitchell, W. Howard.  
 1876 Miehlmg, Charles.  
 1876 Mitchell, Edwin P.  
 1876 Mattson, Morris, M. D.  
 1877 Miller, J. L.  
 1877 Morton, Wm. J., M. D.  
 1877 Matsell, George W.

1856 Niblo, Wm.  
 1859 Norrie, Adam. (L. F.)  
 1870 Neilson, William H.  
 1873 Neilson, Frederic.  
 1874 Nourse, Prof. J. E.  
 1874 Newell, John.  
 1874 Neergard, Wm.  
 1874 Norwood, Andrew G.  
 1874 Niles, William W.  
 1874 Norris, George.  
 1874 Nones, Alexander.  
 1874 Newcombe, Isaac B.  
 1875 Nesmith, R. D., M. D.  
 1875 Newton, Gen. John, U. S. A.  
 1875 Northrop, A. L.  
 1875 Newton, Isaac.  
 1876 Niles, Marston.  
 1876 Nott, J. V. Henry.

1868 Ogden, Wm. B.  
 1868 Ogden, Alfred.  
 1869 O'Connor, Charles.  
 1874 Ottendorfer, Oswald.  
 1874 Osgood, Franklin.  
 1874 Orton, William.  
 1874 Olyphant, Robert M.  
 1874 Olney, Peter B.  
 1874 Owen, Edward H.  
 1874 Oakley, E. Benedict.  
 1874 Owen, Edward L.  
 1874 Owen, Frederick N.  
 1875 Otterbourg, Marcus.  
 1875 Ottiwell, John D.  
 1875 O'Connor, Thomas H.  
 1875 Opdyke, William S.  
 1876 Owen, Wm. H.  
 1876 Olmsted, Fred'k Law.  
 1876 Olmstead, Dwight H.  
 1877 O'Gorman, Richard.  
 1877 Ogden, Isaac C., Jr.

1852 Prime, Frederick. (L. F.)  
 1852 Poor, Henry V. (L. F.)  
 1852 Pierrepont, Henry E. (L. F.)  
 1855 Pierrepont, Edwards.  
 1857 Pyne, Percy R.  
 1859 Purser, Geo. H.

## Date of election.

1859 Prime, Fred'k E. (L. F.)  
 1860 Phelps, Royal. (L. F.)  
 1862 Phillips, Geo. W.  
 1868 Powers, Wm. P.  
 1868 Pfeiffer, Carl.  
 1868 Paulison, John P.  
 1868 Parton, James.  
 1869 Pruyn, John V. L., LL. D.  
 1870 Putzel, Mayer.  
 1871 Potter, Howard.  
 1871 Peabody, Charles A.  
 1872 Parish, Henry.  
 1873 Plum, Elias.  
 1874 Phelps, Charles H.  
 1874 Parker, Willard, M. D.  
 1874 Peake, Wm. I.  
 1874 Peckham, Walton H.  
 1874 Peabody, Arthur J.  
 1874 Pell, Robert L.  
 1874 Penfold, Wm. Hall.  
 1874 Phelps, I. N.  
 1874 Phoenix, S. Whitney. (L. F.)  
 1874 Potter, Orlando B.  
 1874 Pondit, John.  
 1874 Popham, Wm. H.  
 1874 Pancoast, George.  
 1874 Paton, John.  
 1874 Parsons, George W.  
 1874 Paris, Sherman.  
 1874 Pastor, Henry.  
 1874 Perry, Oliver H.  
 1874 Pratt, Daniel R.  
 1874 Preble, John O.  
 1874 Porter, John K.  
 1874 Palmer, James W., Jr.  
 1874 Packer, Elisha A.  
 1874 Powers, George J.  
 1874 Pellew, Henry E.  
 1874 Prichard, Wm. M.  
 1875 Pierrepont, Henry E., Jr.  
 1875 Phillips, Capt. Charles B., U. S. A.  
 1875 Parke, Gen. John G., U. S. A.  
 1875 Prentice, W. P.  
 1875 Parish, Daniel, Jr.  
 1875 Pope, General John, U. S. A.  
 1875 Pohlman, Wm.  
 1875 Pfund, Anton.  
 1875 Poppenhusen, Adolph.  
 1875 Peipers, Hugo.  
 1875 Porter, Gen. Horace.  
 1875 Pullman, George M.  
 1875 Pumpelly, Prof. Raphael.  
 1875 Putnam, Prof. F. W.  
 1876 Perkins, George W.  
 1876 Parsons, Levi.  
 1876 Peet, William E.  
 1876 Plum, James R.  
 1876 Palmer, Gen. W. J.  
 1877 Peaslee, Edmund R.  
 1877 Prime, Rev. Wendell, D. D.  
 1874 Quintard, Edward A.  
 1875 Quinn, Lieut. Jas. B., U. S. A.  
 1854 Ruggles, Samuel B.

## Date of election.

- 1854 Rutherford, L. M.  
 1856 Randolph, Anson, D. F.  
 1856 Remsen, William.  
 1856 Riker, John H.  
 1859 Rapallo, Charles A.  
 1859 Reckendorfer, Joseph. (L. F.)  
 1861 Rogers, C. B. (L. F.)  
 1868 Raven, Anton A.  
 1868 Rhineland, Wm. C.  
 1868 Roberts, Marshall O.  
 1868 Rose, Cornelius.  
 1870 Rutherford, John A.  
 1872 Robbins, Chandler. (L. F.)  
 1872 Roelker, Bernard.  
 1873 Reed, Mrs. Sylvanus.  
 1873 Reinhart, B. F. (L. F.)  
 1873 Reynolds, C. T.  
 1874 Robeson, George M.  
 1874 Reid, Whitelaw.  
 1874 Rives, Francis R.  
 1874 Richardson, Wm. A.  
 1874 Rollins, Edward A.  
 1874 Richard, Auguste.  
 1874 Ruggles, Philo T.  
 1874 Richards, Augustus L.  
 1874 Rogers, H. Livingston.  
 1874 Riley, Charles V.  
 1874 Riker, Wm. J.  
 1874 Rütten, August  
 1874 Requa, James M.  
 1874 Reynes, Jayme.  
 1874 Renauld, Peter A. H.  
 1874 Richard, Charles B.  
 1874 Rhoades, John H.  
 1874 Ramsay, Charles G.  
 1874 Rathbone, Aaron H.  
 1874 Ransom, F. A.  
 1874 Russell, Archibald D.  
 1874 Rhoades, Lyman.  
 1875 Roosevelt, Clinton.  
 1875 Robinson, Henry E.  
 1875 Rives, G. L.  
 1875 Rossell, Lieut. Wm. T., U. S. A.  
 1875 Robbins, H. W., Jr.  
 1875 Roberts, Nathan B.  
 1875 Read, J. Meredith.  
 1875 Ranft, Richard.  
 1875 Raht, Edward E.  
 1875 Rose, Charles.  
 1875 Rosenfeld, Isaac.  
 1876 Ross, Wm. B.  
 1876 Rodriguez, J. C.  
 1877 Rose, Theodore.  
 1877 Rice, A. Thorndike.  
 1877 Roome, Wm. P.  
 1853 Smith, James O., M. D.  
 1854 Sewell, Henry F.  
 1855 Stuart, Robert L.  
 1856 Stebbins, Henry G.  
 1856 Spofford, Paul N.  
 1856 Schermerhorn, Wm. C.  
 1856 Sherman, W. Watts.  
 1859 Schell, Augustus. (L. F.)  
 1859 Schultz, John H. (L. F.)

## Date of election.

- 1860 Stuart, Alexander.  
 1860 Stout, Francis A. (L. F.)  
 1861 Suckley, George, M. D., (L. F.)  
 1868 Sanger, A. L.  
 1868 Spencer, Charles S.  
 1868 Seward, Clarence A.  
 1868 Shea, George.  
 1868 Smales, Holbert.  
 1869 Savage, John. (L. F.)  
 1869 Strebeigh, Robert M.  
 1869 Schmidt, Oscar E.  
 1870 Schell, Richard. (L. F.)  
 1870 Sherwood, John.  
 1870 Sistare, George K.  
 1870 Stoughton, Edwin W.  
 1870 Schafer, Samuel M.  
 1870 Schafer, Simon.  
 1870 Seligman, Joseph.  
 1870 Seligman, James.  
 1870 Seligman, Jesse.  
 1870 Stoughton, Charles B.  
 1871 Shaler, Gen. Alexander.  
 1871 Swan, William H.  
 1872 Stern, Myer.  
 1872 Stengel, Prof. Frederick.  
 1872 Steiger, E.  
 1872 Simpson, Gen. Jas. H., U. S. A.  
 1872 Stuyvesant, Rutherford. (L. F.)  
 1873 Smith, James M.  
 1873 Stevin, Thomas.  
 1873 Sturgis, Frederick.  
 1873 Spencer, James C.  
 1873 Strong, Charles E.  
 1873 Scott, Julian. (L. F.)  
 1873 Southworth, Alvan S. (L. F.)  
 1873 Sturgis, Frank K.  
 1874 Stuart, W. Whiteright.  
 1874 Stone, Henry.  
 1874 Sands, Harry M.  
 1874 Siegman, Michael.  
 1874 Spingarn, Siegmund.  
 1874 Steinway, William.  
 1874 Storrs, Charles. (L. F.)  
 1874 Sands, Philip J.  
 1874 Smith, Daniel Drake.  
 1874 Squires, Robert.  
 1874 Sloan, Samuel.  
 1874 Schermerhorn, F. Augustus.  
 1874 Stuyvesant, Robert R.  
 1874 Scott, Col. Henry L.  
 1874 Scribner, John Blair.  
 1874 Scudder, Henry J.  
 1874 Stuart, Joseph.  
 1874 Sigel, Gen. Frank.  
 1874 Swarr, David M.  
 1874 Stokes, James.  
 1874 Strong, W. L.  
 1874 Sturgis, Appleton.  
 1874 Stewart, D. Jackson.  
 1874 Stevens, Alexander Henry,  
 1874 Sherman, Benjamin B.  
 1874 Shethar, Samuel.  
 1874 Sheafe, J. F.  
 1874 Schieffelin, Samuel B.  
 1874 Scott, Thomas A.



## Date of election.

1874 Sutherland, Josiah.  
 1874 Stiger, Wm. E.  
 1874 Stillwell, Benj. M.  
 1874 Sawyer, Warren.  
 1874 Sands, Andrew H.  
 1874 Sanford, Samuel B.  
 1874 Schaus, William.  
 1874 Simpkins, N. S., Jr.  
 1874 Spinney, Joseph S.  
 1874 Salomen, Edward.  
 1874 Sewell, Robert.  
 1874 Striker, J. A.  
 1875 Stanford, Wm. H.  
 1875 Smith, Lewis Bayard.  
 1875 Smith, Charles Stewart.  
 1875 Stewart, Col. Charles S., U. S. A.  
 1875 Sturges, Henry C.  
 1875 Schultz, Carl H.  
 1875 Short, Prof. Charles.  
 1875 Stone, Charles Francis.  
 1875 Sheridan, Gen. Philip H., U. S. A.  
 1875 Sandford, Elliott. (L. F.)  
 1875 Stranahan, J. S. T.  
 1875 Schofield, Gen. John M., U. S. A.  
 1875 Schieffelin, H. Maunsell.  
 1875 Schack, Fred.  
 1875 Sulzbacher, William.  
 1875 Sherman, Isaac.  
 1875 Sibley, Gen. Henry H.  
 1875 Schiff, Jacob H.  
 1875 Strazburger, Oscar.  
 1875 Schlesinger, Alfred.  
 1875 Smith, Apollos.  
 1875 Smith, Augustine.  
 1876 Schem, Prof. Alexander J.  
 1876 Smith, Harsen H.  
 1876 Sibley, Gen. Hiram W., U. S. A.  
 1876 Spaulding, Henry F.  
 1876 Smith, Dwight, M. D.  
 1876 Stryker, Gen. Wm. S.  
 1876 Struve, Hans G. A.  
 1876 Stone, A. B.  
 1877 Schuyler, Philip.  
 1877 Shearman, William P.  
 1877 Sanger, Henry S.  
 1877 Sanger, Major Joseph P., U. S. A.  
 1877 Schaff, Rev. Philip, D. D.  
 1854 Thompson, Rev. Joseph P., D. D.,  
 (L. F.)  
 1855 Tellkamp, T. A., M. D.  
 1856 Tiffany, Charles L.  
 1856 Townsend, Randolph W.  
 1857 Taylor, Bayard.  
 1857 Tremain, Edwin R.  
 1859 Tracy, Charles.  
 1868 Taylor, Douglas.  
 1868 Tilden, Samuel J.  
 1870 Taylor, George.  
 1870 Tuckerman, Lucius.  
 1870 Thomson, James.  
 1872 Tower, Gen. Z. B., U. S. Army.  
 1872 Tracy, William.  
 1873 Townsend, Martin I.  
 1874 Tooley, James W.

## Date of election.

1874 Thompson, David G. (L. F.)  
 1874 Tracy, John F.  
 1874 Tiemann, Peter C.  
 1874 Therasson, L. F.  
 1874 Tefft, Erastus T.  
 1874 Thorne, Jonathan.  
 1874 Tousey, Sinclair.  
 1874 Trevor, John B.  
 1874 Taylor, Alfred J.  
 1874 Thorne, Wm. H.  
 1874 Turner, Herbert B.  
 1874 Terry, Commodore Edward, U. S. N.  
 1875 Tompkins, E. H.  
 1875 Taintor, Charles M.  
 1875 Thurber, Francis B.  
 1875 Twining, Major W. J., U. S. Army.  
 1875 Terry, Gen. Alfred H., U. S. Army.  
 1875 Toel, William.  
 1875 Terbell, Henry S.  
 1875 Thornell, Thomas L.  
 1876 Tappan, J. Nelson.  
 1876 Trenchard, Edward.  
 1876 Tilden, William.  
 1876 Tompkins, Hamilton B.  
 1876 Thompson, John C.  
 1876 Tucker, Paul.  
 1876 Totten, Lieut. George Mansfield, U.  
 S. Navy.  
 1876 Terry, Rev. Roderick.  
 1877 Thomas, T. Gaillard, M. D.  
 1877 Tillinghast, Wm. H.  
 1877 Talcott, James.  
 1877 Tucker, Rev. Wm. J., D. D.  
 1877 Trowbridge, Prof. Wm. P.  
 1876 Uhl, Herman.  
 1875 Upton, Gen. Emory, U. S. Army.  
 1854 Viele, Gen. Egbert L.  
 1868 Van Vorst, Hooper C.  
 1868 Van Santvoord, C.  
 1869 Vanderpoel, Aaron J.  
 1870 Van Brunt, Charles H.  
 1874 Voorhis, Wm.  
 1874 Van Alen, Jas. J.  
 1874 Vanderbilt, Wm. H.  
 1874 Van Alen, Gen. J. H.  
 1874 Vincent, Frank, Jr.  
 1874 Vyse, Thomas A., Jr.  
 1874 Van Volkenburgh, F.  
 1874 Van Rensselaer, K.  
 1874 Vail, Henry F.  
 1875 Vance, Samuel B. H.  
 1875 Van Buren, John D., Jr.  
 1875 Valentine, Lawson.  
 1875 Von Post, H. C.  
 1875 Vanderpoel, A. Ernest.  
 1875 Verhuvén, Henry F.  
 1875 Varick, Theodore R., M. D.  
 1875 Von Dorrien, S.  
 1876 Van Hoesen, George M.  
 1876 Van Brunt, Cornelius.  
 1877 Vanderbilt, Cornelius.  
 1877 Voorhees, Charles H.

## Date of election.

1853 Watts, Ridley. (L. F.)  
 1854 Webb, Wm. H.  
 1854 Wetmore, Samuel. (L. F.)  
 1856 Warren, James K.  
 1856 Westermann, B.  
 1859 Ward, George Cabot. (L. F.)  
 1860 Winston, Frederick S.  
 1866 Wendell, Jacob.  
 1868 White, Alexander M.  
 1869 Ward, Gen. Elijah.  
 1869 Weber, Leonard, M. D.  
 1869 Wreaks, Charles F.  
 1870 Webster, Sidney.  
 1870 Wilson, Gen. Jas. Grant. (L. F.)  
 1870 Wright, E. Kellogg.  
 1870 Weston, Theodore, C. E.  
 1870 Ward, T. W.  
 1872 Wetmore, Wm. Boerum. (L. F.)  
 1872 Williams, Stephen C. (L. F.)  
 1872 Wells, Jacob.  
 1873 Weeks, John A.  
 1873 Weiner, Joseph, M. D. (L. F.)  
 1873 Worthen, Wm. E.  
 1874 Webb, Gen. Alexander S.  
 1874 Watson, William.  
 1874 Weyman, Charles S.  
 1874 White, Lieut. Com. H. C., U. S. N.  
 1874 Waite, Chief Justice M. R.  
 1874 Wesendonck, Hugo.  
 1874 Wheeler, Everitt P.  
 1874 Wadsworth, Julius.  
 1874 Warren, George Henry.  
 1874 Wallack, J. Lester.  
 1874 Weber, Albert.  
 1874 Walker, William.  
 1874 Wetmore, George P. (L. F.)  
 1874 Wales, Salem H.  
 1874 Willets, Samuel.  
 1874 Watson, Col. B. F.  
 1874 Wyckoff, Jacob F.  
 1874 Williamson, David B.  
 1874 Wilder, Marshall P.  
 1874 Wilkeson, Samuel.

## Date of election.

1874 Willard, Seymour.  
 1874 Worth, James L.  
 1874 Waite, Charles C.  
 1874 Walraven, Ira E.  
 1874 Wood, Fernando.  
 1874 Wooster, George H.  
 1875 Work, J. Henry.  
 1875 Wheeler, John V.  
 1875 Warren, Gen. G. K., U. S. A.  
 1875 Willard, Lieut. J. H., U. S. A.  
 1875 White, Charles Trumbull.  
 1875 Woodruff, Gen. J. C., U. S. A.  
 1875 Wilson, Gen. J. H.  
 1875 Wilcox, Franklin A.  
 1875 Wilkes, George.  
 1875 Warner, Lewis T., M. D.  
 1875 Windmüller, T.  
 1875 Windmüller, Louis.  
 1875 White, David, C. E.  
 1875 Winslow, Gen. Edward F.  
 1875 Williams, Gen. George B.  
 1875 Waller, Prof. Elwyn.  
 1875 Whitehead, William, U. S. A.  
 1875 White, Loomis L.  
 1875 Whipple, C. W.  
 1875 Wissmann, J. F.  
 1876 Ward, Roswell B.  
 1876 Walker, Evan T.  
 1876 Wedemeyer, A. J. D.  
 1876 Wrigley, Henry E.  
 1877 Ward, W. S.  
 1877 Waters, James T.  
 1877 Woodruff, Col. D., U. S. N.  
 1877 Weir, Robert F.  
 1871 Youngs, Henry I.  
 1874 Young, Mason.  
 1875 Yoshidi, Kiyonari.  
 1877 Youmans, Prof. E. L.  
 1874 Zachos, Prof. J. C.  
 1868 Zaborowski, Martin.  
 1875 Zollikofer, Oscar.

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PART I.

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TRANSACTIONS

OF THE

SOCIETY FOR THE YEAR 1877.

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ANNUAL REPORT  
OF THE  
COUNCIL OF THE AMERICAN GEOGRAPHICAL SOCIETY  
FOR THE YEAR 1877.

NEW YORK, *January 7, 1878.*

The Council, in reporting to the Society the condition of its trust, would say, that the principal features of the past year have been the unusual interest of the Fellows in its library and collections, its stated and special meetings, and the pleasant accommodation afforded by its building.

Since the last annual report seven meetings of the Society, and eleven meetings of the Council have been held.

At the annual meeting, held January 16th, 1877, Chief-Justice Daly delivered his annual address upon "The Geographical Work of the World in 1876."

On February 6th, Mr. S. F. Emmons read a paper entitled, "The Volcanoes of the United States Pacific Coast."

On March 13th, Dr. William J. Morton read a paper entitled, "South African Diamond Fields, and the Journey to the Mines."

On May 22d, a meeting was held to discuss the plan of the King of the Belgians, for the exploration and civilization of the interior of Africa, and the suppression of the slave trade; upon which occasion remarks were made by the Rev. J. B. Pinney, ex-governor of Liberia; the Rev. Alexander Crummell, D. D., of Liberia; Paul B. Du Chaillu, John H. B. Latrobe, President of the American Branch of the African International Association; and by Chief-Justice Daly.

On November 8th, the Rev. Selah Merrill, D. D., Archaeologist of the American Palestine Exploration Society, delivered a discourse entitled, "Modern Researches in Palestine."

On December 17th, Mr. J. A. Bennet, late U. S. Consul at Bogota, South America, read a paper entitled, "My first trip up the Magdalena, and life in the Heart of the Andes."

At these several meetings there have been presented a great variety of subjects, embracing almost every branch of geographical science, and which will be found in the published transactions.

By gift and by purchase the library has been increased 945 items—books, pamphlets, charts and maps.

The annual report of the treasurer, Mr. George Cabot Ward, shows a cash balance to the general fund of \$1,032.71. The permanent fund in his hands, as trustee, has increased, with interest, since last report, to the sum of \$3,872.51; making a grand total to the credit of the Society of \$4,905.22.

It has printed and circulated abroad among the scientific societies, and to the Fellows of the Society and correspondents, five numbers of its Bulletin. The frequent application for duplicate copies of these publications attest the high estimation in which they are held.

The State Survey, which owes its existence to the Society, and more particularly to the urgent efforts of several of its members, has been continued during the past year under the directorship of Mr. James T. Gardner, lately our General Secretary. The report of the Commissioners of the Survey, soon to be presented to the Legislature, will completely vindicate the wisdom of the Society in assisting to found that important work, and will prove the value of the service that it has thus rendered to the State.

In no one year has the Society prospered as in the last; nor has the attention given to its business details excluded a constant solicitude for its true objects—the diffusion of correct geographical information and the promotion of scientific exploration and survey.

Very respectfully,

(Signed)

WILLIAM REMSEN,

*Chairman of Council.*

## FELLOWS ELECTED IN 1877.

*February 6th, 1877. Fellows Elected:*—Andrew Fiske, Le Grand Lockwood, William J. Flagg, Clarence King, Theodore Rose, Christian Börs, F. L. Crosby, Prof. Charles A. Briggs, A. T. Rice, E. B. Elliott, Cornelius Vanderbilt. *Corresponding Member*—Prof. Wm. H. Brewer, New Haven, Ct.

*March 13th, 1877. Fellows Elected:*—Philip Schuyler, John Landesman, John Lindley, Thomas L. Kane, Prof. E. L. Youmans, Richard O'Gorman, Fred. W. Nitschke, Henry M. Day, Frank H. Norton, Prof. M. J. Drennan, Edmund R. Peaslee, M. D. *Corresponding Member*—Prof. A. S. Packard, Jr., Salem, Mass.

*May 22d, 1877. Fellows Elected:*—J. A. Beall, Geo. R. Blanchard, Wm. P. Shearman, Wm. J. Morton, M. D., Augustus Gaylord, John Elderkin, L. Murray Ferris, Jr., H. F. Guleke, M. D., John M. Barbour, Robert F. Weir, Jas. B. Nicholson, Henry Shelton Sanford.

*November 8th, 1877. Fellows Elected:*—Eliphalet W. Blatchford, John H. B. Latrobe, Major Joseph P. Sanger, U. S. A., the Rev. Philip Schaff, D. D., Charles H. Voorhis, the Rev. Wendell Prime, D. D., Gen. J. B. Kiddoo, the Rev. William J. Tucker, D. D., Isaac C. Ogden, Jr., William P. Roome. *Corresponding Members*—Samuel Richard Van Campen, Esq., London, England; Señor Angel Ortiz, Seville, Spain; Señor A. P. de Carvalho Borges, Minister of Brazil, at Washington, D. C.; Viscount Bom Retiro, Rio Janeiro, Brazil; Viscount Porto Seguro, Minister of Brazil, at Vienna; Señor Don T. T. M. Homem de Mello, Rio Janeiro, Brazil; Georges d'Arseniew, St. Petersburg.

*December 17th, 1877. Fellows Elected:*—Prof. William P. Trowbridge, George W. Matsell, Hon. William Dorsheimer. *Corresponding Member*—Jess Young, F. R. G. S., Wisbeach, England.

## FELLOWS DECEASED

Years 1874, 1875, 1876, 1877.

## Date of election.

1874 ANDREWS, LORING.  
 1874 ANTHONY, CHARLES L.  
 1875 ALTHOF, HERMAN, M. D.  
 1874 BROOKS, ELISHA.  
 1874 BUTTS, ISAAC.  
 1874 BARRON, THOMAS.  
 1858 BARNEY, DANFORD N.  
 1874 BYRD, GEO. J.  
 1860 BLODGETT, WM. TILDEN.  
 1875 BOYLE, EDWARD.  
 1857 BEEKMAN, JAMES W.  
 1871 CHARLICK, OLIVER.  
 1861 CARY, LUCIUS E.  
 1874 CLARK, LUTHER C.  
 1874 DELAFIELD, HENRY.  
 1874 DEPEYSTER, JAMES F.  
 1874 DWIGHT, TIMOTHY T.  
 1874 DICKINSON, JOHN B.  
 1875 DAVIS, Admiral C. H., U. S. Navy.  
 1876 DOWLEY, JOHN.  
 1876 DWIGHT, TIMOTHY T.  
 1875 DE LONG, CHARLES E.  
 1874 EAKIN, THOMAS.  
 1874 ENGS, PHILIP W.  
 1874 ELY, DAVID J.  
 1875 FELLOWS, LOUIS S.  
 1874 FITZHUGH, W. A.  
 1874 FOSTER, GEORGE J.  
 1852 FIELD, HICKSON W. (L. F.)  
 1874 FIELD, M. B.  
 1876 FINLAY, E. S., M. D.  
 1874 FLEISS, ROBERT A.  
 1874 FRANCIS, LEWIS.  
 1868 GARDNER, A. K., M. D.  
 1852 GREEN, JOHN C. (L. F.)  
 1874 GARNER, WM. T.  
 1856 GESCHIEDT, LOUIS A.  
 1873 GAVIT, JOHN E.  
 1874 GORTON, EDWIN G.  
 1874 GRISWOLD, JAMES C.

## Date of election.

1856 HUNTER, JAMES.  
 1868 HEGEMAN, WM.  
 1869 HAYS, WM. J.  
 1874 HALLGARTEN, LAZARUS.  
 1874 HAMILTON, JEREMIAH G.  
 1874 HARRISON, THOMAS S.  
 1874 JONES, LEWIS C.  
 1874 JONES, JOHN Q.  
 1874 JUDAH, SAMUEL B. H.  
 1874 KELLER, CHARLES M.  
 1874 KITCHEN, JAMES.  
 1865 KING, GEORGE.  
 1874 KITELTAS, EUGENE.  
 1874 KITCHEN, WILLIAM K.  
 1870 KANE, J. GRENVILLE.  
 1854 LEFFERTS, MARSHALL.  
 1875 LULING, CHARLES.  
 1875 MOERING, H. E.  
 1875 MORRIS, Prof. O. W.  
 1874 NOURSE, ALFRED P.  
 1874 ONATIVIA, JOSE V.  
 1859 OGDEN, WILLIAM B.  
 1869 PRUYN, JOHN V. L., LL. D.  
 1874 STEELE, OLIVER R.  
 1869 SLEVIN, JAMES M.  
 1859 STEWART, ALEXANDER T.  
 1868 SMITH, AUGUSTUS F.  
 1858 STRAZNICKY, E. R., M. D.  
 1859 STALLKNECHT, F. S.  
 1875 SMITH, BENJAMIN.  
 1874 SIMONS, Lieut. S. W., U. S. Navy.  
 1874 SKIDMORE, JEREMIAH.  
 1859 TURNER, P. W.  
 1874 WHEELWRIGHT, B. F.  
 1865 WELLS, SAMUEL R.  
 1868 WILLIAMS, B.  
 1874 WHITLOCK, WM. JR.  
 1874 WILLIAMS, JOHN S.  
 1870 WHITE, JOHN H.  
 1874 WALTER, ELLWOOD.



## ALPHABETICAL LIST

*Of Foreign and Domestic Geographical and other Scientific Bodies with which this Society is in Communication, and constant Exchange of Publications.*

1. Academia Real das Sciences, Lisbon, Portugal.
2. Academy of Natural Sciences, Philadelphia, Pa.
3. Academy of Natural Sciences, Davenport, Iowa.
4. Academy of Sciences, St. Louis, Mo.
5. Academy of Natural Sciences, Minneapolis, Minn.
6. American Antiquarian Society, Worcester, Mass.
7. American Naturalist, Philadelphia, Pa.
8. American Social Science Association, Detroit, Mich.
9. Boston Society of Natural History, Boston, Mass.
10. Bureau of Education, Washington, D. C.
11. Caucasian Geographical Society, Tiflis, Russia.
12. Central Bureau of Statistics, Stockholm, Sweden.
13. Circolo Geografico Italiano, Turin, Italy.
14. Comissão Central Permanente de Geographia, Lisbon, Portugal.
15. Cornwall Library, Cornwall-on-the-Hudson, N. Y.
16. Essex Institute, Salem, Mass.
17. Etablissement Géographique de Bruxelles, Belgium.
18. Ferdinandeum in Innsbruck, Austria.
19. Geographical Society, Lyons, France.
20. Geographical Magazine, London.
21. Geographical Society, Hamburg, Germany.
22. Geographical Society, Amsterdam, Holland.
23. Geographical Society, Marseilles, France.
24. Geographical Society, Munich.
25. Geographical Society, Dresden, Germany.
26. Geographical Society, Hermannstadt, Austria.
27. Geographical Society, Copenhagen, Denmark.
28. Geographical Society, Bremen, Germany.
29. Geographical Society, Madrid, Spain.
30. Geographical Society, Weimar, Germany.
31. Geographical Society, Quebec, Canada.
32. Geographical Society, Bombay, India.
33. Geological Society, Edinburgh, Scotland.
34. Geological Survey, Montreal, Canada.
35. Geographische Anstalt, Gotha, Germany.
36. Gesellschaft für Erdkunde zu Berlin, Germany.
37. Gewerbeschule, Bistritz, Austria.
38. Guido Coro, "Cosmos" Turin, Italy.
39. Historical Society, Iowa City, Iowa.
40. Hungarian Academy of Sciences, Pesth, Hungary.
41. Hydrographic Office, London.

42. Imperial Russian Geographical Society, St. Petersburg.
43. Imperial Royal Academy of Sciences, Vienna.
44. Imperial Geographical Society, Vienna.
45. Instituto Historio Geografico del Rio de la Plata, Buenos Ayres, S. A.
46. Kais. Königl. Geologische Reichsanstalt, Vienna.
47. Königl. Gesellschaft der Wissenschaften, Göttingen, Germany.
48. König-Sächs. Gesellschaft der Wissenschaften, Liepzig, Germany.
49. L'Exploration, Paris.
50. Library of Congress, Washington, D. C.
51. Literary and Philosophical Society, Liverpool.
52. Literary and Philosophical Society, Manchester, England.
53. Melbourne Observatory, Melbourne, Australia.
54. Mexican Geographical and Statistical Society, Mexico.
55. Natural History and Philosophical Society, Belfast, Ireland.
56. Nature, London.
57. Naturforschende Gesellschaft, Emden, Germany.
58. N. Y. State Museum of Natural History, Albany.
59. N. Y. State Library, Albany.
60. New York Academy of Sciences, New York.
61. Philosophical Society, Wellington, New Zealand.
62. Polymathic Society, Vannes, France.
63. Pulkowa Observatory, Pulkowa, Russia.
64. Real Academia Espanola Arqueologica y Geografica, Madrid, Spain.
65. Revue Maritime et Coloniale, Paris.
66. Revue Géographique, 37 Rue Scheffer, Paris.
67. Revue Géographie, Paris.
68. Roumanian Geographical Society, Bucharest.
69. Royal Geological Society, Dublin, Ireland.
70. Royal Geographical Society, Rio Janeiro, Brazil.
71. Royal Society of Victoria, Melbourne, Australia.
72. Royal Danish Academy of Sciences, Copenhagen, Denmark.
73. Royal Geographical Society, London.
74. Royal Academy of Sciences, Munich, Germany.
75. Royal Society of Sciences, Upsala, Sweden.
76. Royal Prussian Statistical Bureau, Berlin.
77. Royal University, Christiania, Norway.
78. Royal Society, London.
79. Royal Cornwall Polytechnic Society, Cornwall, England.
80. Royal Academy of Sciences, Brussels, Belgium.
81. Royal Institute for Philology, Geography, and Ethnography of Dutch India, The Hague, Holland.
82. Royal Dutch Meteorological Institution, Utrecht, Holland.
83. Royal Hungarian University, Pesth, Hungary.
84. Royal Asiatic Society, London.
85. Section of the Imperial Russian Geographical Society, Orenburg.
86. Smithsonian Institution, Washington, D. C.
87. Sociedade de Geographia, Lisbon, Portugal.
88. Société de Géographie, Geneva, Switzerland.
89. Société Belge de Géographie, Antwerp, Belgium.
90. Società Geografica Italiana, Rome.
91. Société de Géographie, Paris.
92. Société de Géographie, Montpellier, France.
93. Société Belge de Géographie, Brussels, Belgium.
94. Société des Sciences Naturelles, Cherbourg, France.

95. Société de Géographie Commerciale, Bordeaux, France.
96. Society of Natural Sciences, Buffalo, N. Y.
97. Statistical Society, London.
98. Statistische Amt des Duetschen Reichs, Berlin.
99. Trübner and Co., London, England.
100. The Academy, London.
101. The Asiatic Society, Yokohamo, Japan.
102. United States Coast Survey, Washington, D. C.
103. Verein für Erdkunde, Darmstadt.
104. Verein für Geographie und Naturwissenschaften, Kiel, Germany.
105. Verein von Freunden der Erdkunde, Leipzig, Germany.
106. Victoria Institute or Philosophical Society of Great Britain, London.

## GIFTS TO LIBRARY AND MAP ROOMS, 1877.

Ship Canal through the Isthmus of Darien, by T. O. Selfridge, Washington, 1874; Navy Department Exhibits at Philadelphia, Washington, 1876; Annual Report of the Secretary of the Navy, 1875; Polytechnic Review, Vol. II., 1876; Exploration and Surveys for a Ship Canal through Nicaragua, Washington, 1874; Reconnaissance of Northwest Wyoming, by Wm. A. Jones, Washington, 1874. Prof. J. E. Nourse.

Annual Address before Vermont Historical Society, by Hon. Edward A. Soules, St. Albans, 1876. The Society.

Report on the Jetty System in Cumberland Sound, by Q. A. Gillmore. The Author.

Europe and America in 1870. N. Y., 1870. Nathan Appleton, Esq.

Address delivered before Meeting of Naturalist Society at Gray, September, 1875, by Lieut. Charles Weyprecht. Letter addressed to the Paris Geo. Soc., by Lieuts. Weyprecht and Wileyeck. T. A. Havemeyer.

Statistisches Jahrbuch, Baden, 1875, Karlsruhe, 1876. Statistical Bureau, Karlsruhe.

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Universal Biography, N. Y.; Geology and Physical Geography of Mexico, by Baron Egloffstein, N. Y., 1864; Eighth and Ninth Annual Reports of the Trustees of the Peabody Museum, Cambridge, 1875-76; Journal of Anthropological Institute of N. Y., Vol. I, N. Y., 1871-72; Report on the Polaris Expedition, Washington, 1873; Annual Report of Long Island Historical Society, 1864, Brooklyn, 1864; New Jersey Boundary Question, by Gen. Jno. Cochrane, N. Y., 1865; Le Canal du Darien, par Malte-Brun, Paris; A. Darien v. the Suez Canal, by X., Paris, 1876; Message of the President on the "Virginius" Affair, Washington, 1876; Spectrum Photography, by Henry Draper, N. Y., 1873; The Great Pyramid of Gizeh, Cincinnati, 1871; Report of the Park Commissioners, N. Y., 1870; Report of the Lighthouse Board, 1874; De la Salle among the Senecas, Buffalo, 1874; Superior City, by E. Pelz, Bremen, 1866; Naval Institutions, by Wm. M. Wood, Buffalo, 1862; Monagas and Paez, N. Y., 1850; Documents on Venezuela, N. Y., 1848; Southern Line of Railway to the Pacific, Phila., 1874; On the East and North Extension of the Gulf Stream, Wash., 1872; Reconnoissances in the Dakota Country, by Lieut. G. K. Warren; New American Cyclopædia, 16 vols., N. Y., 1857-63; Tableau de Paris, par E. Tesier, Paris, 1852; Map of the City of New York; Plan of the City of New York, 1782; Solar Investigations, by John Ericson, N. Y., 1876.

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- Index to Publications of Maine Agricultural Society from 1850-75. Augusta, 1876. Maine Board of Agriculture.
- The Races of North Coast of Europe, by A. H. Von der Horck. Berlin, 1876. The Author.
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- CHARTS OF—Kuril Islands, Tauzanga Harbor, Mussawa Channel, Port Stanton, Boqueron of Callao, The Pelleo Group, Islands of Mariane and Caroline Groups, Tapinsan, West Coast of France, Auckland Harbor, Lower California, West Coast of China Sea; West Coast of South America, Nos. 12, 14, 19; China Sea, Southern part; New Hanover, New Ireland and New Britain; Bougainville Island, Dominica, Coast of Ecuador, Cape Haiti, Irish Channel, Coast of Labrador, Coast of Mexico, North Polar Sea, Magador Harbor, Algier. Commodore R. H. Wyman.
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- Transportation Route along the Wisconsin and Fox River, by G. K. Warren, Wash., 1876; Improvement of the River Vistula, Wash., 1876; Illumination and Beaconage of the Coast of France, by L. Reynaud, Wash., 1876; Reprint of Map of 1671 of N. E. part of U. S., Wash., 1876; Map of Explorations, etc., in New Mexico and Utah, by Macomb and Dimmock; Third and Fourth Reports upon South Pass of Mississippi River; Report on the Bulkhead Walls, 1876; Biographical Sketch of Gen. Jos. G. Swift, by Gen. G. W. Cullum, Wash., 1876; Great Basin of Utah, by Capt. Simpson; Explorations and Surveys by Lieut. Wheeler, Vol. III, Wash., 1876; Expedition from Santa Fé to Junction of Grand and Green Rivers, by Capt. Macomb, Wash., 1876. Gen. G. W. Cullum, U. S. Army.
- Semi-Centennial Celebration of Hamilton College, Utica, 1862; Inauguration of President Brown, of Hamilton College, 1867; History of the Perry H. Smith Library Hall, Utica, 1873; Dedication of the Kirkland Monument, Utica, 1873. Rev. S. G. Brown, Hamilton College, N. Y.
- Christian Researches in Asia, by the Rev. Claudius Buchanan, Phila., 1813; Six Months on the Plains, by the Rev. E. B. Tuttle, Chicago, 1868. Gen. Jas. Grant Wilson.

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- by C. B. Comstock; U. S. Explorations of the 40th Parallel, Vol. VI.; U. S. Surveys W. of the 100th Meridian, Topographical Atlas and Annual Report. Gen. A. A. Humphreys.
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- On the Peopling of America, by A. R. Grote. Buffalo, 1876. The Author.
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Consul-General Schumacher.

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PART II.

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PAPERS READ BEFORE THE SOCIETY. .

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NOTE.—AUTHORS ALONE ARE RESPONSIBLE FOR THE SENTIMENTS EXPRESSED IN THEIR  
RESPECTIVE PAPERS.

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## THE VOLCANOES OF THE PACIFIC COAST OF THE UNITED STATES.

BY S. F. EMMONS.

Earthquakes and volcanoes, from the earliest times, have been the natural phenomena which most excited wonder and awe in the human mind. To the primitive man they were the direct manifestations of the power and anger of an unseen and vindictive spirit. The earthquake, being visible only in the *results* of its destructive work, has not been clothed by his superstitious mind with the personal attributes assigned to its more tangible brother, the "burning mountain," which he regards as the abode of an unseen spirit, whose wrath at the misdoings of the human race, when it can no longer be restrained, manifests itself in fire and destruction to all the dwellers around. Even our half-civilized Indians of the Northwest, in spite of their association with the white man, cannot be induced, by hope of reward or fear of punishment, to approach the snow-covered peaks in their midst, whose actual manifestations of volcanic energy must exist in their minds as dim traditions; but which, nevertheless, they regard as the abode of an evil spirit, who will draw them down to certain destruction, if they come within his reach.

The incredulous spirit of modern science regards these manifestations of a hidden power with no less interest, but sees in them, instead of the personal spirit, a possible clue, which, by investigation, may lead to the discovery of the causes and manner of the formation of our earthly dwelling-place, and how it has become, from a mass of incandescent gas, as the generally-received nebular hypothesis would have us believe, the rigid mass of contorted, rocky strata, of infinitely varying composition, which constitutes the present surface of the globe. With his seismograph, the student of earthquake phenomena determines the direction, height, and breadth of the waves or movements of the earth's surface, which are manifested in earthquake-shaken countries, and hopes some day to establish a bureau from which earthquakes may be foretold, as "Old Probabilities" now tells us when to expect rain. Following the path of the earthquake through a mountain region he studies the work it has accomplished, throwing down a portion of a mountain here, building up another there, and reasons out the probable influence which such movements of the surface had in the original building up of our mountain systems.

In the volcano the geologist finds an even more direct and evident manifestation of nature's processes—an actual example of rock formation and mountain building; for, geologically speaking, all volcanoes, even those which have been quiet or extinct within historical times, are young and newly formed, and hence show in their structure a comparatively fresh and unaltered example of mountain architecture, and instances are not wanting of volcanoes having built themselves up in a very short time, as it were out of a level plain.

Humboldt first enunciated the great philosophic conception that the phenomena of volcanoes and earthquakes are an expression of the reaction of the earth's interior upon its exterior. After having visited the immense volcanoes of the Andes, he thought that to account for their great elevation it must be supposed that, at the time of their formation, the earth's crust had been lifted up in a dome shape by the force of the accumulated gases and molten rock beneath, which afterward poured forth from the summit of the dome where its crust was thinner and more easily pierced. This so-called crater-of-elevation theory, whose most prominent upholders were Humboldt and the scarcely less famous

Leopold von Buch, has, in more modern times, fallen into disrepute, and the present school of English geologists—the uniformitarian school, of which the late Sir Charles Lyell was the head—does not admit that there has been any elevatory or pushing-up force exercised by the lavas proceeding from a volcanic vent, but that the mountain is formed simply by the accumulation of successive flows, piled one above the other around the central orifice.

Mr. Poulett Scrope, who is, probably, the most eminent English volcanic geologist, and who has been the principal opposer of the crater-of-elevation theory, says that the steep angles of dip which are found in the stratified lavas of many volcanoes may be explained by the fact that the steepest, and, indeed, the majority of volcanic peaks are formed of trachytic lavas, which are light, crystalline and viscous, and were, probably, not in a completely molten condition at the time of their ejection; that for this reason, as well as on account of their property of cooling more rapidly, they might be piled up to a great height, without flowing out laterally to so great a distance as their angle of inclination might lead one to expect. That, on the other hand, the lava-flows which have extended to great distances at comparatively slight inclinations were of basaltic or basic lavas, which have a much greater fluidity in the molten condition, and from their physical characteristic (their cooler surface forming a non-conducting envelope) preserve their internal heat indefinitely.

The facts upon which Mr. Scrope has founded his theories have been gathered almost exclusively from the classic European localities, the extinct volcanoes of the Rhine and of Auvergne, the still active Mediterranean volcanoes of Vesuvius and *Ætna*, and their less important brethren Stromboli and Santorin, upon which an immense amount of scientific labor and careful investigation have been expended. It is easy to understand, therefore, of how great importance it is to geological science that careful and thorough investigations should be made in the volcanic regions of this country, where the same phenomena are presented on a far grander scale than in Europe, that it may be seen whether the rules, so rigorously laid down there, are confirmed by our facts.

A most important contribution to the science of volcanic rocks has already resulted from investigations made in the western United States. An eminent German geologist, Baron Ferd. von Richthofen, whom long study and experience in the volcanic regions of Europe had peculiarly fitted for the task, spent a number of years in California and Nevada, studying the infinite variety of volcanic rocks found there, and, in 1868, published under the auspices of the California Academy of Sciences, as the result of his labors, a memoir entitled "A Natural System of Volcanic Rocks." In this memoir he made the first attempt yet made of classifying the Tertiary volcanic rocks, which present so great differences of mineralogical composition and physical structure, according to their relative age. This classification, whose general correctness has been confirmed in the most remarkable manner by the investigations of Mr. Clarence King's Exploration of the 40th Parallel, was criticised in a most illiberal manner, and its results ridiculed by Mr. Scrope, who fancied that he discovered therein a possible admission of the partial correctness of the crater-of-elevation theory, which he prided himself upon having long ago most effectually demolished.

These few remarks are not intended as a preamble to any technical geological discussion, which might, perhaps, be hardly appropriate upon this occasion, and which the uncompleted condition of the exploration of which I am to speak would not authorize, but merely as a suggestion of the peculiar interest from a geological point of view, aside from the charms of discovery and adventure, which such expeditions present.

Volcanic rocks, in the broader sense of the word, are not confined to actual volcanoes. Rocks which, in respect to their mineralogical composition and

physical character, are quite analogous to lavas, are found spread out over vast extents of country where no traces of volcanic craters are found. These are supposed to have come from so-called massive eruptions; that is, to have been poured out upon the surface in former geological periods from immense fissures in the earth. Such are the popularly-called "trap-rocks" of the Connecticut valley, and those which form the Palisades of the Hudson, which, however, antedate in age the principal outflows of volcanic rocks. The term is more strictly confined to those which were poured out during the Tertiary period—that epoch of the world's history which immediately preceded the appearance of man upon the earth. The actual volcanoes of the present day may be said to represent, in a general way, the last dying efforts of the great eruptive agencies of former times, concentrated into single isolated vents.

Within the United States the appearance of Tertiary volcanic rocks is mostly confined to the western portion, included in the great elevated region of the Rocky mountains; in the line of Territories bordering its western crest they cover a very great proportion, perhaps nearly half, of the surface. It is difficult to picture in one's mind the conditions of this region at the time of such intense exhibitions of volcanic energy. We know that then the Pacific ocean encroached upon the great valleys of California, and extended up to the very foot-hills of the Sierra Nevada, while, in the interior basins, were great fresh-water lakes or seas of ever-varying outlines; a much warmer climate than that of the present day prevailed, and possibly a tropical luxuriance of vegetation flourished.

From time to time this region must have been the scene of terrific exhibitions of volcanic phenomena, in comparison with which the catastrophes of modern times—even in those countries most subject to earthquake shocks and volcanic eruptions—would sink into comparative insignificance. We know that in some parts, notably in the upper basin of the Columbia and Snake rivers, tens of thousands of square miles were covered by continuous sheets of volcanic rocks, often many hundred feet in thickness. It is difficult to estimate the effects of these frequent outbursts upon the animal and vegetable life of this region; for, at the present day, in spite of occasional catastrophes, they find their most luxuriant development in volcanic regions; and though the animals and plants of those times are now largely replaced by different forms, and a desert exists where formerly was a garden, the chill influence of the long and destructive ages of cold of the Glacial period would sufficiently account for their extinction. As the massive eruptions of volcanic material gradually ceased, and the gaping fissures in the earth's surface healed and were covered over, we may imagine along the western coast of that time a line of volcanic vents like beacon-fires, lighting up the rocky headlands, from which issued almost continuous clouds of steam and sulphurous gases, accompanied by frequent showers of rocks and ashes and outflows of hot lava, which gradually built up around the orifices immense mountain-masses.

At what time these eruptions ceased we have no means of definitely determining. In the cold, white peaks of to-day, however, scored and carved as they are by glaciers, so that in many cases only traces of their former structure are left, the casual observer would scarcely suspect these ancient fiery mountains; and yet even now there slumbers within their mass a spark of the ancient fire, which may some day break forth into a conflagration. The volcanoes of the Pacific coast of the United States are included in that great volcanic belt, the "Ring of Fire," which surrounds the Pacific ocean, and which throughout the greater part of its extent presents actually active volcanoes. Those of our country are in the dormant or quiescent condition, or, as is the general term, are extinct. There are, it is true, traditions in regard to some of them of eruptions within the present century; but allowance must be made for the vividness of



the mountaineer's imagination, since examination shows that they must have been of very slight importance, probably only showers of ashes. It is not impossible that they may some day become active, but the approach of this condition will be sufficiently heralded by the floods which will proceed from the melting of their snow-coverings.

In the map which I have prepared it has been endeavored to present the physical structure of the region of these volcanic phenomena in such relief as to be readily understood. It represents an extent of coast-line north and south, of about nine hundred miles, corresponding in latitude to our eastern coast-line, from the Carolinas north to the Gulf of St. Lawrence, and includes the greater part of the States of California and Nevada, with all of Oregon, Washington Territory, and a narrow strip of Idaho. The line of mountains parallel to the coast which stretches from one extremity of the map to the other, is that of the Sierra Nevada and the Cascade mountains, which forms the western border of the great elevated mountain region included in the Cordilleran or Rocky mountain system. The Sierra Nevada rises in long, gentle slopes, for fifty miles, from the great California plains on the west, and presents an abrupt mountain wall over-looking the elevated desert valleys of the interior or Nevada basin on the east. From its culminating points in the region of Mount Whitney, at the southern extremity of the map, which reach an elevation of nearly 15,000 feet, its crest falls off slightly to the north, and where crossed by the railroad its peaks are about 9,000, and its passes 7,000 feet above sea-level. In the northern portion of California its continuity is broken, and from Lassen's Peak northward, for nearly 100 miles, it is no longer visible as a continuous chain, but is replaced by broken ridges and isolated volcanic peaks, standing interspaced, with comparative regularity, in the direct line of the Sierra. These peaks rise above the snow-line, and form nature's monuments to mark the boundary line between the interior plains and the coast-region. The geological continuation of the Sierra Nevada, as far as our limited knowledge of the geology of that region permits us to determine, would seem to be formed by the comparatively unknown chain of the Blue mountains, which trends off to the northeast through eastern Oregon.

In northern Oregon and Washington Territory the Cascade mountains occupy a corresponding topographical position with the Sierra Nevada, but are of more recent geological formation, and present a less distinctly defined crest, rising to heights of only 4,000 to 7,000 feet above sea-level. Notwithstanding their inferior elevation, they seem to mark even more sharply than the latter the climatic boundary line between coast and interior basin-regions, or that of frequent rains, and of almost perfect aridity during two-thirds of the year. Owing to the greater rainfall in these more northern regions, as well as their difference of latitude, the immense pine forests which clothe only a portion of the Sierra spurs, here extend from the summit down, through the very valley-bottoms, growing with an almost tropical luxuriance, and forming a very serious obstacle to exploration. Along the crests of the Cascade mountains extends the line of volcanic cones, here rendered more impressive by the contrast of their greater accumulation of snow with the forest-covered mountain-ridges below.

The coast-line throughout this extent of country is marked also by a series of mountain-ridges, in general of inferior elevation and more irregular structure, known as the Coast ranges. Between them and the Sierra Nevada lie the long valley-plains of the St. Joaquin and Sacramento rivers, forming a trough-like depression, to which, in Washington Territory, corresponds the partially submerged valley of Puget's Sound, bounded on the west by the almost unexplored Olympus mountains. The more prominent of the volcanic cones represented here are Lassen's Peak and Mount Shasta, in northern California; Mount Pitt,

the Three Sisters, Mount Jefferson and Mount Hood, in Oregon; and Mounts St. Helens, Adams, Rainier and Baker, in Washington Territory.

Along the Sierra Nevada proper, which was lifted above the sea long before Tertiary times, volcanic activity has been rather locally confined to a few small volcanic vents along its eastern base, near Mono lake, and to flows of basaltic lava on its western slopes, which have, in many instances, covered the gold-bearing gravels of the late Tertiary times.

Mono lake is a picturesque little sheet of water, about fourteen miles in its longest diameter, lying nestled at the eastern foot of the Sierra Nevada, about opposite the far-famed Yosemite valley. These mountains form a precipitous granite wall, some 8,000 or 9,000 feet in height on its western shores; while to the eastward extend the flat sage-brush deserts characteristic of the great basin of Nevada. Its waters are very dense and rich in mineral salts, so dense that the body floats upon its surface like a cork, while the salts which it holds in solution—principally soda and borax—render it peculiarly cleansing, so that the barbers of the neighboring mining town of Aurora use it as a natural "shampoo-water." In the midst of the lake is a small island, which contains a crater and which abounds in hot springs; to the presence of the latter, which, doubtless, also exist below the surface of the lake, is due the peculiar fact that the surface-waters of the lake are quite warm to a depth of a few inches, while the deeper parts are icy cold, since the lake is mainly fed by the melting of the Sierra snows.

To the south of the lake extends a line of volcanic craters, forming a low ridge, which are relatively unimportant in height by the side of the towering peaks of the Sierras—their highest peak rises only about 2,700 feet above the valleys—but which are extremely remarkable for the rock of which they are formed, a black glass, like bottle-glass, known to the geologists under the name of obsidian. This is the only region in which this rock, so much prized by the Indians for making their arrow-heads, is known to occur in any considerable quantity, and yet small fragments may be found in almost any part of the Rocky Mountain region, often hundreds of miles distant. The craters are generally surrounded by a "cinder-cone," or circular, rampart-like ridge of loose scoriæ and volcanic ash, within which are piled up irregular masses of black and grey glass and white frothy pumice, the latter so light as to float on water, and often drawn out in silky threads, like spun glass.

Lassen's Peak is the southernmost of the chain of volcanic peaks represented on our map, and forms, as it were, the northern extremity of the Sierra Nevada crest. To the technical geologist it is, perhaps, the most interesting of all those I have mentioned; it was in its study that Von Richtofen gathered the most important facts which led to his classification of the relative ages of volcanic rocks. Here are found traces of long-continued volcanic activity, remnants of ancient craters formed and destroyed ages ago. To the original andesitic eruptions have succeeded those of trachyte and rhyolite; the latter in the remarkable granitic form known as Nevadite, the masses of which, in cooling, have shrunk and split up in the most remarkable manner, resulting in a confused region of riven rock-masses, to which the appropriate name of Chaos has been given. The final flows have been of basalt, which rock has covered such immense extents of country to the north and east. Indications of the internal heat still remaining, at no great depth beneath the surface, are found in its solfataras and hot springs, from which there is a constant escape of sulphurous gases and steam; these are concentrated in the basin of an old crater, christened in the characteristic Californian vernacular, Bummer's Hell. Here, also, are found the so-called "mud volcanoes;" little conical mounds only a few feet in height, with a central orifice, from which from time to time are thrown out

masses of soft, wet mud; within them a constant rumbling, like subdued thunder, may be heard at all times; and, by plugging up the orifice, an artificial eruption may, after a short interval, be produced, and the plug will be thrown out with great force. The scenery around Lassen's Peak is wild and savage; but as the cone itself rises only about 2,000 feet above the surrounding country, attaining an altitude of 10,000 feet above sea-level, and is, moreover, out of the line of travel, it does not afford to the general tourist the attraction found in the loftier peaks to the north.

Mount Shasta, one of the grandest as well as the most accessible of our great mountain-peaks, stands comparatively isolated, being surrounded by low ridges on the east, and on the west by a broad, open, treeless valley, through which runs the projected line of the California and Oregon Railroad. Its summit, which has been carefully measured by the barometer, reaches a height of 14,440 feet above sea-level, so that from this valley, whose elevation is between 2,000 and 3,000 feet, may be seen nearly 12,000 feet of mountain rising before one. Its ascent, which, though laborious, is by no means dangerous, will doubtless, at no distant day, be included, with the visit to the Yosemite valley, in the list of things to be "done" by the tourist who visits the Pacific coast.

By the kindness of my friend, Mr. Gilbert Munger, the well-known artist, I have been able to present this evening characteristic sketches of the three principal peaks of which I am to speak, copied from studies made by him on the spot. The view of Shasta is taken from a point about thirty miles to the northward of the peak; the shoulder that we see on the west of the summit is a beautiful crater of almost perfect circular form, nearly a mile in diameter, whose rim is about 2,000 feet lower than the main summit, while its interior is about a thousand deep, and contains another central cone, formed, like the rim, of broken lava-masses, and rising to an equal height. The rim of the crater is a mere knife-edge of rock, so narrow that at the time of our exploration, when we passed a night on it, it was found necessary to break away the rock with our hammers in order to make a place wide enough to sleep on. On the highest point of this rim, the lava-masses are perforated by curious holes like worm-holes, which are lined with green glass, the result of the melting of the rock by lightning, for which this point seems to present great attraction. It has, consequently, received the name *fulgurite*, which was given by Abich, a German geologist, who first observed this phenomenon in the mountains of the Caucasus.

The main summit consists of two peaks separated by a little valley or gorge about 100 feet deep, in which is a hot spring, still sending out steam and sulphurous gases. It would appear to be a portion remaining of a much older cone, whose outlines are now almost irre recognizable. Another attraction of the peak are the still active glaciers, which are found on its northern slopes, and which, though of less imposing dimensions than those of the more northern peaks, are much more accessible, and remarkable as being the first that had been found, at the time of their discovery, within the United States. Along the western slopes of the peak are the remains of hundreds of little volcanic cones, stretching out into the valley. A larger one to the southwest, known as Little Shasta, presents in outline a remarkable resemblance to the larger peak, a miniature reproduction, as one might say, though it is nearly equal in height to Vesuvius, rising more than 3,000 feet, and far steeper and more difficult to ascend.

About 60 miles north of Shasta, in southern Oregon, is Mt. Pitt, a volcanic peak, presenting a beautifully regular outline as seen from Jacksonville, on the west. Its height is less than 10,000 feet, yet its upper portion is snow-covered during the greater portion of the year. Its exploration was undertaken by Mr. A. B. Emmons in the summer of 1875, but his report, which will doubtless give many interesting details of its formation, has not yet been published. It shows,

also, the traces of a crater-structure, broken down on the northeast side; its lavas, though having a general resemblance to the trachytes of Shasta, present some interesting peculiarities of composition, which render their classification somewhat difficult, and their determination can only be satisfactorily made by the aid of the microscope.

Throughout the region to the northeast of Shasta, in eastern Oregon and northwestern Nevada, are immense extents of country covered by flows of basaltic rock. Such flows are characterized by a peculiar topography. Broad stretches of table-topped ridges are cut through in every direction by an intricate network of narrow gorges and ravines with perpendicular sides, abounding in natural fortresses and caves, and traversed by streams which frequently disappear for distances of many miles beneath the horizontal beds of basalt, to reappear in a most unexpected manner, and which are generally designated by the name "Lost River." It was in such "lava-beds," as the popular term is, in a region near the boundary of California and Oregon, that during the late Modoc war a mere handful of Indians were able, by their intimate knowledge of the intricacies of the region, to hold at bay, during several months, the whole military force that could be brought against them.

East of Mt. Pitt are numerous lakes, some of very considerable extent, which are probably fed largely from springs issuing from the volcanic rocks. Most interesting among these is Crater lake, lying east of north from Mt. Pitt, which fills an ancient crater about eight miles in diameter. Its walls rise but little above the surrounding country, but are from 500 to 1,500 feet above the level of the lake, and so precipitous that it is difficult to reach the shores without the aid of ropes. The showers of ashes which once issued from this crater can easily be traced by the peculiar character of the soil, for a distance of about 28 miles east and 10 west of the lake. North of Mt. Pitt, in the line of the Cascade mountains, are the volcanic peaks of the Three Sisters and Mt. Jefferson, little known and of relatively less importance, but rising above the snow-level, and forming a beautiful feature in the scenery of Oregon by the brilliant contrast of their delicate white forms with the sombre green of the pine-clad hills below.

In the region of the Columbia river, which presents some of the grandest and most picturesque scenery of the United States, the volcanic phenomena both of massive eruptions and of crater-cones, which here attain an enormous development, can be seen under most favorable circumstances. This river, which drains an area of nearly 200,000 square miles in the interior basin of the Rocky mountains, has cut its channel, in a cañon-like gorge, transversely through the Cascade mountains almost down to the level of the sea. By means of the section, thus exposed, we are enabled to study the structure of this mountain range to its very core, and are not, as is usually the case, obliged to content ourselves with reasoning it out by inference from the rocks which form its surface.

At the Cascades nearly in the middle of the range, which form the limit of navigation from the ocean, and to which point the work of the Coast Survey has been carried, so as to furnish trustworthy measurements, the basaltic cliffs rise 3,700 feet, nearly perpendicularly, above the river. A thickness then of over 3,000 feet of lava has been accumulated from massive eruptions to form the range at this point. At the base of the cliffs is found a conglomerate or pudding-stone—a rock made up of rounded pebbles and gravel, which time and pressure have compacted and hardened, and which here indicates a former shoreline which has been covered by the basalt. Within the conglomerate are found trunks of trees, some changed to stone, some merely carbonized, with leaf remains, which enable us to determine the geological age of the period immediately preceding the building up of the range at this point. This was the

Miocene Tertiary, a time when a tropical climate prevailed over our whole continent, even far up into the Arctic regions.

This bed of conglomerate also gives a clue to the history of a more recent period, to a change in the course of the river and the formation of the Cascades themselves. The Cascades are rather rapids than falls, where the river descends rapidly for a mile or two, in one place foaming and boiling over masses of broken rock in its bed. They form, as already stated, the head of navigation to vessels coming from below, and a short railroad, some six miles in length, on the northern bank, conveys passengers from the steamer which comes from Portland to that which runs to the Dalles from the head of the Cascades. Just beyond this railroad may still be distinguished in the forests which cover the bottom of the cañon—here considerably wider than the bed of the river—the traces of an ancient stream-bed, somewhat higher than the present one, but which, at no very distant period, was evidently occupied by the river, being more in its direct course than the bed it now occupies at the Cascades. Indians tell us that there was once a natural bridge at the Cascades, by which their ancestors used to cross the river, and this is rendered probable by the existence of flat, table-like masses of basalt on either side, which might have formed the piers to such a bridge. Again, along the shores of the river, above the Cascades, are great numbers of dead tree-trunks, standing in the water and partially submerged even at its lowest stages. Pine trees would not have grown to such size in the water, or even if they had, what should have killed them all so uniformly? The explanation seems simple enough when all these facts are combined. At the time when, in the course of cutting this cañon through the mountains, the river had reached nearly its present level, but was still running in the old stream-bed, its waters found a new outlet by perforating this permeable stratum of conglomerate. The opening thus made grew rapidly larger, owing to the easy disintegration of the conglomerate, until it was large enough to take the whole stream; and this bed being at a depth much lower than the present, the old stream-bed was abandoned, and along the upper side of the river the trees grew down to its very edge, while the river, for a short distance, had the character of the lost rivers of which I have already spoken, being concealed beneath the basalt bridge; but in course of time the supports of the bridge were undermined and the whole mass of overhanging basalt fell into the stream, damming it up so as to produce the present Cascades, and causing a rise or "backing-up" of the water in the upper part of the stream, so that the trees along the edge, having the soil washed away from their roots by the rising water, gradually died and decayed, leaving only the stumps we now see lining the borders of the river.

Mt. Hood, which has the most graceful outline of all these volcanic peaks, rises out of the very crest of the Cascade mountains, about 25 miles south of the Columbia river. The view which you see is taken from the mouth of the Hood river, a stream which rises among the glaciers of its northern slopes, and flows northward through a region densely covered with pine forests to the Columbia river, which it joins about midway between the Cascades and the Dalles.

When the English explorer Vancouver, who gave to this peak its name, first saw it from his ships as he sailed up the majestic Columbia, he estimated its altitude to be at least 25,000 feet, and thought it probably the highest mountain in the world. Col. Williamson, of the Coast Survey, made the first barometrical, and consequently the first trustworthy, measurement of this peak, and his determination has been confirmed by that of Mr. Arnold Hague, of our party, made during his explorations in 1870. By these stricter rules it has fallen from 25,000 to 11,225 feet, but still remains, in the opinion of admirers of mountains, one of the most beautiful peaks in the world. It, also, is only a portion of the



rim of an ancient crater, and its summit consists of a single block of lava only a few feet square, from which one may look down, almost perpendicularly, for thousands of feet on the north, and in other directions at a dizzy angle. Its ascent is made from the east, along the left-hand edge, and is sufficiently trying to one whose nerves have not the steadiness required to look without flinching over the brink of precipices, when standing on a rock scarcely large enough for one foot to rest upon. In the shelter of the peak on the north side, where the walls circle round what was once a crater, clouds frequently collect, even on an almost cloudless day, and from time to time rise above the peak, giving it the appearance of smoking. So deceptive is this appearance, that frequent reports are brought in of an eruption on this peak, whereas its examination by Mr. Hague showed that no eruption can have taken place within a very long time—certainly not within the memory of man.

In Washington Territory, to the north of the Columbia river, in about the same latitude, rise two other volcanic peaks, one to the east, the other to the west of the summit of the Cascade mountains—Mt. Adams and Mt. St. Helens. Neither of these have been explored, or, so far as I know, measured, though their altitude is probably near 10,000 feet.

Mt. Adams, as seen from the east, presents a broad, flat summit, and if it has a crater, it must be of very considerable dimensions.

Mt. St. Helens, on the other hand, is remarkable for its regular conical shape, and being, probably, easy of ascent, it would seem strange that it has never been ascended, since it is scarcely more than 20 miles from well-traveled roads, were it not for the almost impenetrable character of the forests of Washington Territory on the west slope of the Cascade mountains. It is, however, the only peak of which I was able to get a definite account of an eruption. I was told by an old French Canadian voyageur, formerly in the employ of the Hudson's Bay Fur Company, that St. Helens was in active eruption in the winter of 1841-2. To use his expression, the light from the burning volcano was so intense that one could see to pick up a pin in the grass at midnight near his cabin, which is some 20 miles distant in a straight line. I myself could distinguish with my glass the apparent track of a lava-flow which had cut its way through many miles of the forest that clothed its flanks.

The most imposing of all these great peaks, however, are those which are seen from the waters of Puget Sound—Mt. Baker and Mt. Rainier. The former, though only a little over 10,000 feet in height, is much nearer the sea, and, from its more northerly position, has a proportionately greater snow-mass. It has been ascended by an Englishman named Coleman, who published an account of this trip in *Harper's Monthly*, in which, however, little accurate description is given.

Mt. Rainier, or, as the Indians call it, Techoma, "The Great Snow," whose height is 14,444 feet, as determined by the triangulation of Col. Davidson of the Coast Survey, is, doubtless, the grandest single peak in the United States, including Alaska, and probably few mountains in the world surpass it in grandeur. The sketch which you see is taken from Steilacoom prairie, a low plain stretching eastward from the southern end of Puget sound—the term "prairie" in Washington Territory being applied to any natural clearing or space bare of trees. The point of view is distant about 40 miles from the base of the mountain; between is a dense forest-covered region, gently rising in low broad ridges towards its base, but so fore-shortened that the white snow-mass that towers above it seems within a pleasant day's walk. Here the crest of the Cascade mountains, which lies some 20 miles eastward of Rainier, is hidden by it. The peak itself has three summits, all of which are visible from this point. Of these the eastern is a small crater, while the other two are merely remnants of the

walls of a former immense crater, whose restoration would, probably, nearly double the present size of the mountain. Nearer and more exact views of this mountain it has been impossible to obtain, and not to weary you farther with mere verbal descriptions, I shall venture to close the evening's talk with a brief narration of exploration, premising it with a mention of those which preceded my own.

In the year 1857, Lieut. A. V. Kautz (now a Colonel and Brevet Brig. General in the U. S. Army), who was stationed at Fort Steilacoom, on Puget's sound, undertook to make the ascent of Mt. Rainier. His party, which consisted of himself, one army surgeon, two private soldiers and an Indian guide, started from the Mishawl river, a day's ride from the fort, on the 9th of July. They traveled on foot, and after incredible difficulties and hardships reached the base of the mountain on the edge of the Nisqually glacier, at the end of the sixth day's march. On the seventh day they attempted the ascent of the southern peak. As their view was much obstructed by clouds, which overhung and at times surrounded them, the account which they gave is itself somewhat misty, and it is difficult to determine to what height they succeeded in reaching. At a quarter to six in the afternoon they attained a point they thought might be one of the summits, but they could perceive others still higher. As they reached their camp in a descent of three hours—accompanied, it is true, by glissades on the snow, in which one of the soldiers was badly hurt—it seems probable that it may have been merely a prominent point of one of the southern spurs. They found themselves much used up by their continuous hard climbing, and having run short of provisions, did not make another attempt, but returned with all possible speed to their starting point, which they reached on the twelfth day. The account furnished me by General Kautz gives a doleful description of their sufferings during the trip, and the results thereof to the various members of the party have a truly melodramatic flavor. Kautz himself lost his hat and fourteen pounds of flesh, and did not recover for many weeks. The doctor lost twenty pounds, was subject to violent pains in the stomach, and did not recover for three months. The Indian guide had an attack of gastritis and narrowly escaped with his life, while the two soldiers were in the hospital during the remainder of their term of service.

It was from the accounts which Lieut. Kautz brought back that Dr. Geo. Gibbs, geologist to the Pacific Railroad Expedition under General I. I. Stevens, probably derived the information which led him to announce the occurrence of granite as a dyke in recent lavas, proving this rock, hitherto considered of ancient origin, to be of very recent formation. Unfortunately for the success of this demolition of previously conceived geological theories, the facts on which it is founded were not correctly read by Lieut. Kautz. There is, indeed, at the foot of the Nisqually glacier, a mass of granite which, as seen in the cliffs on either side, seems to project up into the beds of trachyte which have flowed down from the volcano. It is not, however, a more recent dyke, but a pre-existing ridge of granite, which, having been covered by the flows of lava, has since been exposed and cut through by the glacial ice, which has channeled the slopes of the peak to a depth of several thousand feet.

From that time until the year 1870, I have no definite knowledge of any attempts to reach Mount Rainier, though I can but believe, from its prominence and apparent proximity, that some enterprising persons have been tempted to explore its slopes. That no account of any such has been published, seems to be sufficient proof that they were unsuccessful.

In the month of August of this year, Messrs. Stevens and Van Trump, of Olympia, W. T., who had long been contemplating an assault upon the snowy giant which is so beautifully seen from that picturesque town, made an excursion



sion through the forest to its foot, and after many hardships succeeded on the 17th of August, 1870, in reaching its summit. Their trip has been graphically described by General Stevens in an article in the *Atlantic Monthly* for November last, and I shall not, therefore, repeat what he has already so well said with regard to the incidents of the trip. They unfortunately under-estimated the difficulties of the ascent, and reaching the summit only at nightfall, were obliged to pass a night there, for which they were entirely unprepared, and which might have had serious consequences for them had they not found jets of steam issuing from the crater, by which they were enabled to keep themselves warm during the cold midnight hours. Mr. Van Trump met with an accident on their descent, from the effects of which he was laid up for several months. As they were only two days at the actual base of the mountain, they necessarily saw but one side of it, and the description given by General Stevens of the northeastern side, must have been derived from other sources than his own observation.

It was in the latter part of the summer of 1870, that the geological party under the charge of Mr. Clarence King, of which I am a member, commenced a survey of the volcanic peaks already mentioned, with the view of presenting to the public accurate and detailed maps of each, and a geological monograph on their structure and petrological characteristics. Owing to the lateness of the season, the work of that year among the northern peaks scarcely amounted to more than a preliminary reconnaissance, and from causes beyond our control the plan has never been carried to completion.

On the 14th of September, having just spent five days with Mr. King on Mount Shasta, exploring its northern slopes and passing a night on either of its summits, it was decided that I should immediately commence a survey of Mount Rainier, lest in that more northern region the autumn rains and snows should drive us away ere our work could be accomplished. Mr. King proposed to join me himself as soon as his survey of Shasta should be completed; but, as it proved in the end, this work took so much more time than he had anticipated, that he did not make the attempt. We then were unaware that any attempts even had been made to reach its summit, and its exploration presented all the charms of an utterly unknown region.

Three hours after the decision was made I was driving rapidly to Yreka, some forty miles distant, where I took the stage, and after three days and nights of jolting over mountain roads, of whose roughness an eastern traveler can form but a faint conception, arrived at Portland to learn that Messrs. Stevens and Van Trump had only a few weeks before succeeded in reaching the summit of Rainier. In spite of this fact, it was the general opinion of the inhabitants that the attempt to take in a pack-train, which our baggage and instruments would require, and especially at this late season, was very dangerous if not utterly impracticable. Two days were now spent in a journey to the Dalles, to secure the co-operation of Mr. A. D. Wilson, who, as topographer, had been spending several weeks with Mr. Arnold Hague on the survey of Mount Hood.

A third day sufficed to get together the necessary provisions, and we embarked at daylight of the fourth on a steamer for Kalama, whence we reached Olympia, at the southern end of Puget sound, after a ride of three days, during which we never succeeded in catching a glimpse of Mount Rainier, owing to the rain-clouds which overhung us. At Olympia General Stevens kindly gave us all the information he could to facilitate our reaching the mountain, but, as it afterwards proved, the route followed by him on foot was not passable for mules. From here, a charming ride of twenty-five miles through alternate groves of pine and oak and open glades, brought us to Yelm prairie, where we found Mr. Longmire, the settler who had guided the Stevens

party through the forest. He was the only person we could hear of who really had crossed the range at this point, the so-called mountaineers in this region being notoriously untrustworthy; and though many offered their services, claiming to have been at the base of the peak, close questioning easily proved that they were "romancing." Longmire belonged to the best type of western settlers, and the impression gathered from our conversation with him, that he was a thoroughly honest, energetic man, having, withal, an extremely modest estimate of his own abilities, was more than confirmed on a closer acquaintance. It was only with extreme difficulty that we succeeded in persuading him to accompany us, as he was firm in the opinion that it was too late in the season to undertake the trip with safety, and the opposition of his wife, who averred that the fatigues had more effect upon him than a month's sickness, was even more pronounced. I really believe that it was only a feeling of duty for the advancement of science, and a personal regard for us, fearing that some misfortune might befall us should we undertake the trip alone, as we most certainly should have done, that finally decided him.

It was about noon on the 27th of September that we finally started on our exploration; a party of four men with five animals, for we left the bulk of our provisions and mules to be brought along by Mr. King when we should have broken the way. Realizing, though perhaps not to its full extent, the difficulties of getting loaded mules through the tangled forest, we had reduced our baggage to absolute necessities, and allowed ourselves only two pack-mules to carry our instruments, provisions and blankets, while Longmire and I were to take "turn-about" in riding the old white bell-mare, who was to guide and watch over our loose mules. In availing ourselves of this privilege, as her stumbling qualities became more apparent, a most courteous reluctance characterized us both. In our first day's march, by the accidental breaking of one of our cistern barometers, it was found necessary to send back our one camp-man, and our party was thus still further reduced to three men with four animals. Just as we were about to plunge into the forest, the clouds, which had overshadowed us for four days previous, lifted for a moment, and gave us our first view of the magnificent peak we were about to attack; and a most rare sight it was! The dazzling whiteness of its snowy mass, brought out in stronger relief by the few black specks of bare rock peering through here and there, brought it so near that it seemed to rest upon the tops of the forest trees in front of us.

Our first few miles in the forest were exhilarating in the extreme, for our work for the last three years had been among the desert-plains and almost treeless mountains of the great interior basin of the Rocky mountains, while here we passed through endless aisles of stately pines, cedars and firs, whose size increased as we progressed, until trees of 200 and 300 feet in height, and 20 to 30 feet in circumference, became the rule rather than the exception. Animal life in the interior of the forest seemed not very abundant, so that the solemn silence, scarcely broken by the dim rustling of the wind on the distant summits of the trees, and the semi-twilight which the density of the foliage overhead produced, at first quietly refreshing, became ere long gloomy and oppressive.

During the first day's march we crossed the Nisqually river, whose milky waters plainly indicated its glacial origin, and made an early camp on Mishawl prairie, a little opening in the forest to the north of this river; for, in spite of the luxuriant vegetation of the forest, grass was very difficult to find, and our camping-places had to be chosen with especial reference to this very necessary plant. During the following days the passage through the forest, obstructed by fallen trees and tangled undergrowth, became ever more difficult. In spite of his excellent knowledge of woodcraft, as shown in the almost instinctive way in

which he chose his direction, when the only guide was an occasional dim blaze on the trees, Longmire was sometimes obliged to retrace his steps to find our right path. He was quite innocent of the art of cooking, and of any knowledge of our Mexican method of packing our mules, so Wilson and I had this work to do unaided, and the packing, which required to be done over about once in every quarter of an hour after the frequent trials of strength between our plucky little mules and the fallen giants of the forest, tried our patience to the utmost. Wet through during the day by the crossing of streams and fens and contact with the moist undergrowth, we would enjoy to the utmost our evening chat, after the day's work was over and the dishes washed up, as we sat steaming round a huge fire, under the shelter of a huge cedar beneath whose drooping branches covering a space wide enough for a small army the ground seemed never to be directly reached by the rain.

On the fourth day we emerged into the valley of the Nisqually again, where it had been cleared by fire, and at noon the rain, which had been pouring down for we did not know how many days before, clearing away, disclosed to us through the gorge of a precipitous cañon on the north a glimpse of the snowy slopes of Rainier, now apparently not more than fifteen miles distant. Our camp, that night, close to the banks of the stream, was the nearest approach which Longmire had ever made to the mountain, and to us he now surrendered the determination of the route to be followed hereafter.

You will have seen from the sketches shown you this evening, that the general shape of these volcanic peaks is that of a very steep central cone, from which the flanks spread out in long, gentle slopes; these flanks on Mount Rainier have been channeled through by the glaciers which flow down from its sides, into a system of radiating cañons—narrow gorges with almost perpendicular walls from one to two thousand feet in height, while the included spurs have preserved to a certain extent their original broad, gently sloping surface. Could we reach the top of one of these spurs with our animals and baggage, we hoped, from our camp at the foot of the steeper mountain-slope, to be able to make the circuit of the mountain on foot, keeping above the deeper cañon-gorges, near the heads of the glaciers. The task which now lay before us was to find a route practicable for our mules, by which to reach the top of one of these spurs.

On the fifth day we commenced this task, following up the stream on which we were encamped, which was the main head of the Nisqually river, a stream flowing into the southern end of Puget sound. Our course during the morning lay up the bed of this torrent, fording from side to side, and following the stretches of bare shingle, formed of rounded cobble-stones and boulders of granite, which constituted our only available path, for we were hemmed in on either side by steep, precipitous walls. It was a great relief to see once more the clear sky over our head, and we did not grumble at an occasional wetting, when, in our frequent and sometimes dangerous fordings, the water rolled up over the backs of our animals; for in that respect we were not much worse off than we had been in the continual drippings of the forest undergrowth.

In the afternoon we left the main stream and followed the valley of a branch from the east, the clearness of whose waters indicated that they did not come from a glacier, whence we concluded that it would probably lead us to the summit of a spur between the larger glacier streams. In this, as we afterwards found out, we were not mistaken, but the way proved to be impracticable for our mules. After proceeding a short distance without much difficulty, the valley closed into a narrow gorge, whose steep sides, though supporting a scanty growth of trees and turf, were interrupted by precipitous slopes of broken rock-masses. In our attempt to pass these, our two pack-mules were successively precipitated down amongst the jagged rocks, and though extricated alive, it was

only at the expense of great exertions on our part, and very serious cutting and bruising on theirs. Our sympathy for the unfortunate mules was overshadowed by the loss of our remaining barometer, which was fractured in the struggle, and I was convinced more firmly than ever that the combination of the two occupations of mule-driver and carrier of so delicate an instrument as a barometer, which I had attempted in my own person, was not practicable.

After this failure we had barely time to reach the main cañon again, and find a little spot by the side of the stream with a sufficient accumulation of soil to serve as a cushion between our weary bones and the boulders, before night set in upon us. Our poor animals, in default of any other nourishment, were driven to the alternative of chewing the cud of bitter disappointment or the straps of our saddle-bags, and despite the fact that to protect them we used these articles as pillows, their appearance in the morning showed that they had been chosen.

On the following morning, Wilson and I explored the main cañon on foot up to where, a few miles above our camp, our further progress was barred by a wall of ice some 500 feet high, the end of the Nisqually glacier. From a great arched cavern at its base poured out a foaming torrent, some 30 feet in width, with a thundering roar, while an almost constant shower of boulders over its face forbade a near approach. On the left rose a cliff of beautiful white syenitic granite, whose presence explained the seeming anomaly of granite boulders coming from a volcanic peak; for, in the constant trituration of the stream, the fragments of the light gray trachytic lavas of the lower slopes of the peak had apparently been gradually worn away by their harder granite comrades, so that the latter formed the predominating bulk of the shingle of the stream. On our right were precipitous walls, capped by lava-flows, which had covered this pre-existing granite ridge, their lower slopes indeed covered by trees, but so steep withal that we could climb them only by pulling ourselves up from trunk to trunk by our hands.

There evidently was no possibility of getting our animals out of this cañon, so we retraced our steps down the stream to where we had left what we called by courtesy "Longmire's trail," and pushed further eastward into the valley of the Cowlitz river. This was accomplished in two days' travel through a forest country, which differed from that we had already passed, in that it had been devastated by fire. The blackened trunks of the lofty pines, in part fallen across our path in the wildest confusion, like a gigantic game of jackstraws, in part standing ready to fall without a moment's warning, added difficulty and even danger to our journey; and a steady rain, during three days, augmented the more trivial discomforts of travel, and made us almost regret our former forest covering.

On the Cowlitz we found a little band of Indians, housed in rude "lean-to's," made of slabs of the easily-splitting cedar. In spite of their hardness, as attested by their daily baths in the ice-cold water of the glacier-streams, it was only by the (to them) magnificent reward of a dollar a day that two of their number were induced to guide us to the foot of Mount Rainier by a path known to them in their hunting excursions.

This remnant of a formerly numerous tribe illustrates the condition of many of our northwestern Indians. They consist of only a few families, perhaps not more than a dozen; yet preserve their distinctive language and tribal conditions, live completely isolated, hardly daring to go twenty miles from their home, lest they may encroach upon the territory of some other tribe. As means of communication with other tribes, as well as with the white man, whom this particular tribe rarely see, they use the uncouth Hudson's Bay Company's jargon, or Chinook language, as it is generally called, though it is unworthy the name of a language, consisting only of about 300 words, partly of English, French and

Indian origin, and in part apparently invented by the rough trappers themselves, and partaking of their coarseness.

Under the guidance of our Indians, a comparatively easy though rather wet march of a day and a half brought us finally up on to the crest of the spur east of the head of the Cowlitz river. As we gradually emerged from the forest region into the more open ridge, where grew only isolated clumps of mountain fir and huckleberry bushes, the rain-clouds which had enclosed us for the past three days broke away, and discovered another superb view of the mountain, now quite near us, and yet seeming more lofty and imposing than ever.

The details of its surface were now visible. The very summit was marked by a thin horizontal black line, which we later found to be the rim of the crater. Below this stretched a smooth, unbroken envelope of white, apparently about a third of the way down; then, at irregular distances along its sides, peered out black shoulders of rock, between which were steep broken masses of glacier ice, looking like foaming cascades frozen in the instant of their fall. This lower two-thirds of the peak was the steepest of all, and below it the glaciers, taking the form of ice-rivers, flowed out at more gentle angles, gradually hidden in their ever-deepening beds between the grassy spurs.

Before sunset we had reached the edge of the lower snow-fields, and selected with some care a sheltered spot near a little clump of mountain firs which overhung the Cowlitz glacier, for our permanent camp. We now turned our weary animals loose in a little valley, which formed a naturally enclosed pasture, for in our future explorations over precipitous cliffs and glacier-fields they could be of no further use to us. During our march we had left little notes describing the course we were to pursue on the morrow, carefully fastened under the bark of a tree at each of our camps, to direct Mr. King, who, we expected, would follow us in a short time and bring the much-desired barometer. In anticipation of the arrival of that instrument, we decided to postpone for the present the ascent of the mountain, which otherwise would have been our first task, and in the meantime made a short trip around the flanks of the mountain to examine the glaciers and lavas, and commence the triangulation for our map.

Our first day's trip was among the *nevé* fields and outlying peaks to the east of the main peak, reaching a high enough point to obtain a comprehensive view of its structure on this side. To the east and north it presents an almost perpendicular face, having been cut down by glacial erosion and the action of snow and frost, so that an ascent from this side would seem almost impossible. An outlying mass of lava; forming a jagged peak with overhanging cliffs on every side which rises some 2,000 or 3,000 feet out of these *nevé* fields on the east of the peak, at about a half mile from its base, shows by its bedding lines that it originally formed part of the main mass.

Here we came suddenly upon a little band of mountain goats, who, when aware of our presence, fled with most remarkable rapidity up the icy slopes, crossing crevasses and ascending impossible steepes with the greatest ease. We watched them with wonder as they grew smaller and smaller in the distance, and finally disappeared among the ice-cascades of the steep mountain-side. This rare animal, the *Azama montana* of science, which is found only on the slopes of these snowy peaks, and there in limited numbers, is a very distinct animal from the big-horn or Rocky Mountain sheep. It is a low, heavy-built animal, rather larger than a good-sized ram, snow-white in color, having a thick fur of mixed hair and wool, a long white beard, and two little, black, curved horns like those of the chamois. It passes its day among the snows, only coming down at early dawn to browse upon the fresh green grass along their lower edge. Our Indians, taking advantage of this habit, after concealing themselves for two nights near one of their favorite grazing-grounds, succeeded in killing one, which



they sold to us, and which was a most timely addition to our scanty larder, saving us, as it proved in the end, from possible starvation.

From our permanent camp we made a trip to the northern flanks of the mountain beyond the White river, carrying our blankets, provisions and instruments on our backs. The first valley to the north of the spur by which we had reached the summit we found to be that of a tributary of the Cowlitz river, rejoicing in the euphonious name of Och-hanna-pi-cosh. It heads in an amphitheatre-shaped valley, characteristic of the slopes of Rainier, but of unusually grand proportions, reminding one of the famous *cirques* of the Pyrenees. The walls of this amphitheatre, semi-circular in form, are composed of a thickness of about 2,000 feet of light-gray trachytic lava-beds, capped by as many hundred feet of glacier-ice, which stand as straight and regular as if built of masonry. Over the face of this perpendicular cliff pour a hundred tiny streams of water from under the ice-cap, looking, from below, like so many silver threads, which, in their long fall, are dissipated into a fine mist before they reach the grassy carpet of the valley below. At the lower end of the valley, these waters, united into a foaming brook, make a bold leap over a second cliff above the forest-clad valley beneath, and, striking obliquely the face of a rocky wall, into which they have worn a deep pot-hole some ten feet in diameter, rebound upwards into the air at an angle, forming a most beautiful natural fountain, from which the unpronounceable Indian name of the stream, which signifies "spouting water," is derived.

A high, rocky ridge, probably as much as 7,000 feet above sea-level, which connects Mt. Rainier with the crest of the Cascade mountains, some ten or fifteen miles further east, forms the divide between this stream and the White river, one of the largest, if not *the* largest stream which flows into Puget sound. An immense system of glaciers, some seven or eight in number, which flow down from the steep northeastern slopes of the peak, unite to form this stream, whose name evidently originates from the milky nature of its waters, a character common to glacier-streams. These larger glaciers present all the peculiar phenomena of the glaciers of the Alps, which have been so well described by Agassiz and Tyndall. On the largest, which is about three miles wide where crossed by us, are several medial moraines—great ridges of rock-fragments and loose gravel,—while little brooks of pure water course over its surface and disappear in the midst of their course down round well-like holes called, in Swiss glacier-parlance, *moulins*.

We camped on the north side of these glaciers, and climbed a high outlying peak from whose summit we could see, thousands of feet below us on the north side, another great glacier, and on its surface a deep blue lake, which we estimated to be about an eighth of a mile in diameter. The stream issuing from this glacier is either another branch of the White river, or a tributary of the Puyallup river, which flows from the northwestern slopes of Rainier into Puget sound. On the borders of the White River basin we found, under the lavas, outcrops of porphyritic rocks, which, together with the granite seen at the head of the Nisqually river, proved that eruptive rocks had been poured out in this region in geological periods long before the formation of the present volcano.

On our return from the White river trip we spent some days in measuring a base-line for our triangulation, and in exploring the southern slopes of the mountain, at the head of the Cowlitz and Nisqually rivers. One morning Longmire, who had thus far remained to take care of camp—for he was soon tired of climbing with us—announced his intention of returning home, as he thought the weather looked threatening. Our remaining Indian—one had left immediately upon receiving his pay for the mountain goat—whom we had christened Muck-a-muck, or "hungry," from his inordinate capacity for eating, no sooner

heard of this than he decided that he must go, too. He said that we had now had ten days of pleasant weather, and at this season might soon expect a storm—"hiyou snow"—which, should it come, would, in a short time, bury us neck-deep, and then we could not get away. No persuasion or hopes of gain would induce them to stay, so we bade them farewell, consoling ourselves with the thought that we had now only two mouths to feed instead of four.

After their departure we watched the weather anxiously, for they had told us that if the wind changed to the southwest we would surely have a storm. Sure enough, the next morning the wind had veered round to the dreaded direction. From our elevated position—for we were on a level with the highest summits of the Cascade mountains—we could see the valleys below us gradually fill with heavy storm-clouds, which rolled up angrily against the base of the mountain, and finally enveloped us. It was not a very pleasant outlook, for, even with our scant allowance of a cup of flour and two spoonfuls of coffee per day to each man, our provisions could only last nine days longer, and yet it would not do to go back without having ascended the mountain, even if no barometers arrived with which to measure its height. Four days we spent thus, eating, sleeping and listening to the frequent thunders of the avalanches over our heads, as it were, in the hidden mountain, for we could not venture far from camp for fear of getting lost in the clouds. Fortunately the snow did not fall as deeply as Muck-a-muck had predicted, but it was very cold, and the springs, on which we depended for water, only thawed out for a few hours during the day. Now and again the clouds would break for a few moments, and we would catch a glimpse over the immense sea of white which hid everything below. Shut out thus completely from the rest of the world, our only companions were the white summits of the great volcanoes to the south, which reared above the clouds. On Mt. Adams, the nearest peak, we frequently observed the beautiful phenomenon of a cast of its shape made in the cloud-mass, as the white cloak, which usually hung round its summit, would occasionally lift straight up into the clear air above, like a snowy helmet, keeping perfectly the mould of its form.

At length the wind changed to the northward, the sun came out clear and bright, and we made hasty preparations for our ascent of the mountain without further delay. We baked our three cups of flour each for three days' provision, put hobbles on the old mare that she and her charge might not be tempted to wander away in our absence, rolled up the necessities of life in our blankets, and climbed down the adjoining precipice on to the Cowlitz glacier, which ran about 1,500 feet below our camp. This pack-carrying was the most trying work we had to do, being that to which we were least accustomed, and we found a roll of blankets three feet long by a foot or more in diameter, weighing 30 or 40 pounds and tied to our backs by a bit of clothes-line, an extremely awkward burden in our hand-and-foot descending the steep precipices which border the glaciers. We felt the strain on our loins very seriously in our climb of the following day. The Indians, who are more accustomed to carrying burdens, manage it by passing a strap across the forehead, so that the principal strain comes upon their necks, which have thus acquired a strength like that of a bull.

We selected for our starting-point a little grassy hollow on the edge of the snow, near the twisted trunk of a dead mountain pine (*Pinus flexilis*), the highest bit of fire-wood we could find, and spent the afternoon studying the slopes of the mountain from neighboring eminences, and estimating the time we should require for the climb, knowing we must get back by day-light, or run the risk of freezing to death on the summit. We decided to start at three in the morning, but Wilson was prevented from sleeping during the early part of the night by neuralgia, and when the time came I had not the heart to wake him out of his sound slumber.

At 4 A. M., however, of October 17th, we finally started for the summit of



the mountain. The moon was in its last quarter and shed a pale light over the rocks and snow, so that from our observations of the previous afternoon we had no difficulty in following the route then laid out. Our course at first lay over alternate cliffs of loose, broken lava, and broad ice-fields. The ice-travelling was much the easier, but in the uncertain light of the moon we were afraid of falling into crevasses, and therefore chose rather the more difficult rocks. On we toiled, not fast, but at a steady, unvarying gait, for a couple of hours or more, when the first gray light of morning began to appear over the summits of the Cascade mountains; soon a pale, rosy tinge suffused the tops of Adams and Hood—we were too near to see the summit of Rainier—and now, ere long, the sun burst forth at its full glory. As the rays of light shot upward to the mountain-top, they lighted up the immense masses of ice and snow which overhung us, and gave to them the beautiful transparent blue tinge which may be seen in the interior of the crevasses of a glacier. We reached the foot of the steep rocky spur which we had chosen for the ascent, at the end of the third hour—exactly the time we had allotted—and congratulated ourselves on the accuracy of our calculations. We now had two hours of actual hand-and-foot climbing up a narrow, jagged ridge of huge loose blocks of lava, occasionally meeting a perpendicular cliff, round which we had to climb, clinging as best we could to the little inequalities and cracks in the rock. These spots were often a little trying to one's nerves, as the rock was crumbly, and the ridge on which we stood fell off steeply on either side, while the smooth ice of the glaciers at its foot sloped down at a sufficiently steep angle to send anything which should fall upon it with the swiftness of an arrow into the crevasses below, as we had frequent proof in the occasional fragments of rock which were dislodged from beneath our feet.

These glaciers came down from the foot of the ice-cascades already mentioned, which towered above us on either side, presenting a surface bristling with sharp, icy pinnacles, over which it were impossible for any living thing to climb. At the head of our ridge a great black mass of rock projected from the icy envelope which clothed the mountains, presenting to us an overhanging precipice nearly a thousand feet in height. It was composed of stratified layers of lava and breccia, or hardened volcanic mud. The latter being more yielding, had crumbled away, so as to present a series of shelves within the face of the cliff. At nine o'clock we reached its foot, and stopping for a few moments to finish the breakfast we had done but scanty justice to before, we then crawled cautiously along one of these shelves, about ten feet in width, clinging closely to its upper wall, while the pebbles and sand from under our feet rolled constantly over the precipice below, falling to an unknown depth, and thus we reached the apex of a re-entering angle of the mountain, where the rock and ice-mass came in contact. On our left hand towered pinnacles of ice like huge inverted icicles, while over us on the right hung the cliffs of black and red lava, masses of which were constantly falling, but beyond us, as we were protected by the projecting shelf of rock. At the junction of the ice and rock, however, was a steep, smooth, winding passage, wide enough to admit a man's body, which had been made by the melting of the ice in contact with the rock. Here I found hanging a heavy rope, the first relic we had met of the Stevens party. Crawling cautiously over the slope of gravelly ice which extended out from the foot of this passage, I seized the rope and gave it a strong shake, to test the secureness of its fastening. The test was too much, and it came down upon my head. Fortunately, I had a firm footing; so coiling it about my waist for further use, I loosed the hammer from my belt and advanced to the foot of the chimney-like passage, to cut notches or steps in the ice, by which we might ascend. As, balancing myself carefully on one foot, which rested on a stone frozen in the ice, I leaned forward, the edge of my pack, made up (like that of the French soldier) of knap-

sack and roll of overcoat, struck the overhanging rock, and nearly threw me off my balance, so, straightening up, I let it slip down from my shoulders; as it reached the elbows, thus pinning them together, a sort of nervous shudder came over me, and dropping it hastily without making any provision to catch it, it struck edgewise on the ice, and commenced rolling slowly down towards the brink of the precipice a few yards below us. We watched it go, both unable to move, hoping every minute it would turn on its flat side, but it kept steadily rolling, and soon disappeared over the brink, dropping quietly into space below, and sending up no sound to tell when it had reached bottom. This made us conscious of the danger of our position; moreover, the loss at that time was quite serious, for it contained our little stock of brandy, coffee and firewood, prepared for warming ourselves on the summit, and an overcoat that could not be replaced. We had, however, no time for regret. I cut my steps (holes in the ice deep enough to insert the toes of one foot at a time) and proceeded upwards, reaching in about 40 feet another shelf, where I stopped and drew up Wilson's instrument, he following. Then on again, the chimney becoming constantly steeper, so that at last I could scarcely lean my body back far enough to chop the ice in front of me, for fear of toppling over backward, for the smooth surface offered nothing to hold on to; in the windings of the chimney I could never see far above me, and when I had nearly reached the top, I perceived, to my horror, imbedded in a projecting mass of ice directly overhead, a huge boulder weighing 200 or 300 pounds, now about two-thirds melted out. All the way up there had been a constant rain of small pebbles on my head, for the day was at its warmest point, but as I saw this boulder I hesitated an instant, knowing that its fall meant inevitable destruction. However, to return was equally as dangerous as to proceed, so I continued on. Fortunately it did not fall while we were in the chimney, but when we returned from the summit we looked anxiously for it, and it was no longer there.

Seating myself, somewhat insecurely, on a little rounded ridge of ice at the head of the chimney, I uncoiled the rope, and hauled up the instruments. Wilson followed, holding on by it, though I had sufficient confidence in his steadiness not to tell him how slight a strain would pull me from my seat.

From here, after a short scramble over steep rough hummocks of ice, we reached the upper slope of the mountain. Here a new barrier presented itself to our progress in an immense crevasse, some twenty feet wide, and of unknown depth, which stretched obliquely across our path, extending a mile or more nearly up to one of the secondary summits to the west of the peak at which we were aiming. For a moment this seemed impassable, but climbing a little ridge of glassy blue ice about twenty feet high, we discovered on its further side a natural snow-bridge across the crevasse, and by using our rope after the most approved Alpine fashion, we succeeded in crossing it in safety. Beyond this we met with no crevasses too wide to jump, and now had a comparatively easy climb of a couple of hours to the summit, over an ice-slope standing at an angle of near 30°; steep enough to be dangerous, but whose surface, somewhat softened by the heat of the midday sun, gave us a tolerably secure footing. At one o'clock we had reached the summit of Rainier, which we estimated, from the time it had taken (nine hours), to be about 9,000 feet above our camp at the snow-line.

We stood upon the edge of a bowl-shaped crater of almost perfect circular shape, forming the eastern edge and highest point of the mountain, its interior filled to within 30 or 40 feet of the rim with ice and snow, while on its outer slopes the blackened lava, of which it was composed, was laid bare for a hundred feet or more below its summit. This was the delicate black line, which we had sometimes been able to distinguish from below, as forming the summit. Adjoining this on the west was another semi-circular rim of rock, peering out of the

snow, the remains of a former crater, in the interior of which this more recent one had built itself up. It was strange to see even these comparatively small patches of rock free from the universal covering of ice and snow; the explanation first presented to the mind was their exposed position, and the tremendous force of the wind, which seemed almost sufficient to blow away the very rocks. A second was soon seen in the evidences of internal heat at no great depth below the surface, shown by countless jets of steam and gas, in size from a pin-head to an inch in diameter, issuing around the interior rim of the crater. Near these jets the hard rock is changed into a red clayey mass, and in front of them, by the condensation of the steam, ice-caverns have been formed, some of sufficient size to admit several persons. In one of these we took refuge for a few moments to warm ourselves and thaw our fingers, two of mine being slightly frost-bitten; for although the thermometer was only at the freezing-point, the violence of the wind rapidly abstracted from our bodies the animal heat, upon which the exertions of the climb had already made serious inroads; and in the ragged condition of my own clothes, I was constantly impressed with the seriousness of the loss in letting my over-coat drop over the precipice.

From our summit we could see the two other peaks, only a few hundred feet lower than ourselves, the one to the southwest, and the other to the northwest, one to two miles distant, and separated by the heads of a deep valley filled by ~~not~~ ice which sloped rapidly to the westward between the two peaks. It was evident that this valley was the interior of a still older and larger crater, of the walls of which these two peaks are the remnants. The crater upon which we stood had been built up as an interior cone, entirely within the wall of this older crater, and the outstanding pinnacle of rock on the east, which we had observed on our first day's climb on the glaciers, must be the only remnant left of the east side of this outer cone; over a third of the mountain's mass has been carried away, and that largely by the agency of glacier-ice.

From the northeastern rim of the crater we could look down an unbroken slope of nearly 10,000 feet to the head of the White river, the upper half or two-thirds of which was so steep that one had the feeling of looking over a perpendicular wall. The systems of glaciers, and the streams which flowed from them, lay spread out as on a map at our feet; radiating out in every direction from the central mass, they all with one accord curved to the westward to send their water down towards Puget sound or the lower Columbia river. Looking to the more distant country, the whole stretch of Puget sound, seeming like a pretty little lake embowered in green, could be seen in the northwest, beyond which the Olympus mountains extended out into the Pacific ocean. The Cascade mountains, lying dwarfed at our feet, could be traced northward into British Columbia, and southward into Oregon, while above them, at comparatively regular intervals, rose the ghost-like forms of our companion volcanoes. To the eastward the eye ranged for hundreds of miles over chain on chain of mountain-ridges, which gradually disappeared in the dim blue distance.

Two hours was all the time we dared give to the summit, for both wind and cold were constantly increasing. Wilson had attempted to set up his theodolite on a little knob of ice that projected some 50 feet above the highest point of the crater's rim, but an unusually strong gust of wind had taken both the instrument and him off their feet, and accepting the inevitable he allowed himself to slide gently down its sides, and gave up the attempt. We wished to visit the other two peaks, for they cut off our view to the westward, and the triangulation on that side would require some time, but it was now out of our power.

At three o'clock we commenced the descent. This was in some respects more dangerous than the ascent, for my creepers (a rude spiked sole we had had made for ice-walking by a blacksmith in Olympia) had gone over the precipice

with my pack; every step down the first ice-slope had to be taken with the greatest caution, bracing the foot by the spiked point of a tripod leg, lest a single slip might send me whirling into the crevasses below. Here Wilson took the lead, that, should I slip, his firmer footing might steady me. Our descent of the chimney, which would have been almost impossible otherwise, for our steps were largely melted out, was rendered comparatively easy by the rope, which we fastened firmly in a rock at its head, and left hanging for any future explorer who might wish to make the ascent.

It was just sunset when we reached the foot of the steep slope, and we had an opportunity of observing again that strange shadow phenomenon which Mr. King has noted in his description of Shasta. As the sun sank beneath the horizon its light gradually disappeared from the country below, and only the upper part of the mountain was lighted up; during nearly half an hour the dark conical shadow of this mass traveled slowly eastward over the country, until, reaching the horizon, it rose up against the sky like a second gigantic mountain. Darkness came upon us apace; in the dim starlight every rock seemed a hole, and every hole a rock; footsore and weary, we stumbled along for three hours more, before reaching our camp, and it was a very fortunate chance that guided us to it, for there was nothing to mark the spot where we had left our blankets. Seventeen hours had been spent in the climb, but hunger rather than fatigue was the more prominent feeling with us during the following days.

On our return to the main camp, we found everything safe, though our eyes detected fresh horse-tracks in the sod, which proved to have been the Indians, who had returned to make us a visit when the storm was over. We now turned our faces towards civilization, and as our stock of provisions was reduced to three days' supply, we were forced to select a quicker route than that by which we had come. So, instead of going west, we determined to strike eastward across the Cascade mountains, having learned from the Indians that there was a trail in that direction, by following which we might reach Fort Simcoe, the residence of a Government Indian Agent.

Making everything ready the night before, we got an early start, and marched with such eagerness that night overtook us on a steep mountain-side, where, for fear of losing the trail we could no longer see, we were obliged to camp without water. By the second night we had reached the summit, or divide, of the Cascade mountains, and it was none too soon, for the storm-clouds were following close behind us. All night long the winds raged fiercely about us, and the following day we descended the eastern slope in a drenching rain, which was snow in the region we had just left—the first of the season on that side of the mountains. Our difficulties were not quite over, for it took one day longer than we had calculated to find the Indian reservation, and a very hungry one that was. The good people there looked rather askance at the two ragged, dirty-looking individuals who presented themselves at the door of their comfortable dwelling one afternoon, claiming to be United States explorers who had just made the ascent of Rainier. They were convinced after a while of the truth of our story, and the ravenousness with which we devoured two solid meals within as many hours left no further doubt in their minds. Two days more of rapid traveling brought us to the town of Dalles, on the Columbia, where we were received with rejoicing by our companions, who had given us up as lost, having heard nothing from us since we started into the forest, exactly a month before. My appetite continued to be ravenous for a month afterwards, though I gained eight pounds in the first twenty-four hours after my arrival at the Dalles, upon the far from luxurious fare of a frontier hotel.

## THE SOUTH AFRICAN DIAMOND FIELDS, AND A JOURNEY TO THE MINES.

By WILLIAM J. MORTON, M. D.

When we recall the frequent attention which is now directed to varied and remote parts of the globe, it is, perhaps, a little remarkable that South Africa has met with so little recent notice in America; particularly as this region fairly claims from Americans more than ordinary interest, since here two sister republics—the Orange Free State and the Transvaal—have hewn out a history for themselves. And their existence might, indeed, have claimed a longer obscurity but for the brilliant discovery within their borders of diamonds, which have cast their lustre over the scene and attracted thither the practical energy of working men and capital. I can, perhaps, open the way to a larger interest in southern Africa and her states by describing these diamond fields, which, aside from the part they have played in vivifying the country, offer in themselves points of extreme interest and novelty.

The practical mind of our day still finds moments in which to delight in the romances of Sinbad the Sailor and his experiences in the Valley of Diamonds. And a visit to the diamond valleys of to-day offers, perhaps, the nearest modern realization of the dream. And if the toils and reverses of that ancient traveler were manifold and severe, the modern seeker's experience will hardly fail to be a parallel to that of his mythical predecessor. That a land is unknown and unexplored is sufficient to clothe it with fervid growths of the imagination. The word "Africa" conjures up a hazy vision of strange and remarkable facts and conjectures. If we add, then, the familiar word "diamond," representing wealth in concentrated and dazzling form, we can pardon the most prosaic for indulging in dreamland fancies of easily acquired wealth. But it is my office and pleasure to-night to ask you to go over the scene practically with me, giving a moment only to the journey out to Cape of Good Hope, but devoting most of our time to the trip up to the diamond fields and life at the diamond mines. And at the very outset I feel burdened with the difficulty and responsibility of selecting from the mass of details attendant upon two years' residence in Africa that part which, in this necessarily compressed account, may prove interesting. And in this brief survey of an hour I can only hope to outline, in the roughest manner, a picture which must afterwards be filled in by details which time will not here allow.

There is at present no steamship communication between an American port and the Cape of Good Hope. It is, therefore, necessary to make the journey by way Southampton, England, whence excellent steamers leave weekly for the Cape. Some stop at Madeira, Ascension and St. Helena on the way, while others make the voyage direct, generally in from 23 to 26 days. The opportunity of even a half-day's visit to these three places should not be lost, since each, in its limpid, aqua-marine setting of the soft waters of the South Atlantic, impresses upon the memory its own characteristic and peculiar picture.

On the fifth day from Southampton, after the customary tossing and pitching of the steamship in the Bay of Biscay, Madeira was reached. Madeira, land of trees, clad in the constant verdure of a new and tropical vegetation, with flowers always in bloom, charms the traveler from northern lands. Her vineyards, once deserted for the sugar crop, are again being established. About



the large town of Funchal there is an air of antiquity and of quaintness. The streets are narrow and very steep, and no vehicle is seen except the palanquin, borne by sturdy carriers, or the comical cab on sledge-runners, drawn by oxen, for wheels, owing to the hills, are impossible. There is a sombre cathedral and more sombre jail, but all else is bright and gay, especially the vividly colored dresses and vivacious manners of the inhabitants in the numerous shops and flower and fruit markets.

From this lovely island the vessel sped on towards the Equator, a direction which we all began to realize in the fitful, sultry weather, with unexpected showers and squalls, until we finally found ourselves almost helpless from the lassitude occasioned by the heat. The berths below became unendurably stifling, and many had their mattresses placed on deck for the night. Gentlemen appeared in light linen suits, and ladies in their thinnest muslins. To try to read was to fall asleep; to move, an aggravation; even talking was a bore, and suspended. The sea was glassy and unruffled by any breath of air, but our faithful engine was not won over to listlessness, and soon carried us beyond this enervating zone.

And now we touched at Ascension, a red-brown mass of lava thrown up from the sea; taken by the British government for use as a naval station during Napoleon's confinement at St. Helena, and since retained as such; famous for the jealous care with which it is guarded, and for the mammoth turtles, weighing from 500 to 800 pounds, which are constantly captured upon its shores, and form its only supply of fresh meat. Not a spear of grass or a single tree grows upon the island.

I walked along a magnificent beach, a mile and more in length, which looked like yellow sand, but on examination proved to be wholly round polished grains of sea-shell. Upon this beach the turtles come up to lay their eggs, and are espied by a look-out upon a distant tower, who straightway dispatches a boat to cut off their retreat to the water. The turtle thus intercepted is skillfully turned upon its back and towed to walled-in pens of solid masonry on the edge of the sea. Walking around these pens on their walls, I saw perhaps a hundred clumsy occupants clambering over one another or lying with just their noses out of the pool. I was told there were about two hundred inhabitants upon the island, but I seemed to see almost no one. Long coal-sheds, idle machine-shops and piles of weather-beaten ship-fittings, with a hot, listless, intense New-England-Sunday stillness, seemed the chief features. Taking a big turtle with us, we sped on to St. Helena, climbed Jacob's Ladder, a loft series of steps cut into the solid rock, and made our way to Napoleon's former residence and tomb, and then on to the Cape.

The air now daily grew more cool and invigorating, and on the 26th day at noon we made out the dim cloud of Table Mountain dead ahead, and soon on our left the long line of African coast stood out in bold relief, its breakers, as it seemed to us, dashing to incredible heights. Our first view of the shore excited that wonder which all things continued to produce in this new land. The glassy sea undulated in long rolling swells of unaccustomed size and height, its surface covered with water-fowl strange to our eyes. Oily backed penguins dodged in affright from our bows, and over our heads circled a huge albatross. Towards evening we made out the white line of dwelling-houses huddled up under the now huge black Table Mountain. As the sun set, the anchor dropped. Night came quickly, and out sparkled the tiny lights of Capetown.

In the morning the steamer made her way into the dock, and the town lay extended before our eyes, flattened out on the mountain-slope, with flat-roofed one to two-storied houses, and thronged with its motley crowd of whites, Malays and negroes. We luxuriated in fruit, and rested our eyes with the strange vege-

tation. Here are thirty thousand inhabitants, with a sufficient admixture of the Dutch element to give the city a quaint and slow appearance. With the familiar picture of naked Hottentots on a sandy coast collecting buchu still in my mind, I was agreeably surprised to step from the steamer to a Hansom cab, and be whirled along the streets of a well ordered city to an excellent hotel. To do any justice to Capetown would require a volume by itself. We come now to the less traveled portion of our journey.

There are three routes from the African coast to the diamond mines. The shortest, but least traversed, owing to its greater distance as a starting point inland, is from Natal. The second, that from Port Elizabeth, requires two days' further journey from Capetown by water to the town of Port Elizabeth, and is now the only route traversed by a regular line of stages, which leave every week, crowded with passengers, and make comparatively comfortable trips.

But at the time of my journey up to the diamond country, three years ago, the third—that from Capetown direct to the mines, across the Karroo and Gough deserts—was the most traveled. And since this latter route is now wholly disused for passenger travel, it is well to record its features. From Capetown we had 750 miles to go—north, a little to the east. For \$80, I secured a seat in the wagon or coach of the Inland Transport Company. This wagon was about forty feet long, and box-shaped, with open sides and ends, having five transverse seats, with room for three persons on each seat. Fourteen passengers was our complement, with 40 pounds of luggage allowed to each. On the sides, top and underneath were lashed our baggage and the company's express parcels, until we looked like a country peddler's wagon on a huge scale. We tried our seats, and wondered how we should like seven successive days of travel in them, with but one opportunity for sleep out of the coach, and then only for five hours on the third day.

My fellow-passengers were most agreeable gentlemen and ladies. Several were landed proprietors going up to see after their investments in the mines. One English gentleman, of large means, was on his way to the interior for three years of elephant hunting for pleasure. Another was simply going out to see the mines, while several were diamond merchants going up to buy.

From Capetown to Wellington, our first seventy miles, we go by rail—the big wagon on a platform car, all equipped, minus the horses. Steaming through the ten-mile stretch of the fertile Paarl, dotted with farm-houses, and here and there a school-house or church-spire, we reached Wellington in three hours. A crowd of passenger carts, owned by Malay drivers, with bee-hive hat and long whip, awaited the arrival of the morning train, and outrivaled a London or New York cabman in their vociferous solicitations. Their carts were soon filled, and tearing off at a rapid pace for the village. At the hotel, we partook of what was to prove our unvarying diet for days, viz.: mutton chops and coffee.

This meal finished, the company's bugle sounds; we hear "all aboard" shouted by the guard, and hasten to secure our stated seats. To crowd fourteen into that wagon seemed hopeless as one examined the seats covered with overcoats, rugs, valises, soft hats, canned biscuit, rifles, etc., etc.; but squeeze in we did. Snap went the whip, every time like the report of a pistol, and off dashed our eight horses, plunging, rearing, snorting and kicking, heading now this side, now that, almost facing about at times. And this they would have done, did they not dread at each attempt an encounter with the formidable whip, whose reach covered fifty feet, twenty-five of strong bamboo pole and twenty-five of braided lash. No danger of leaving the road, for we were upon the level plain or "veldt," offering miles of room on either side without fear of upset. Such a start soon shook us into what appeared to be our natural and proper places.

Here a word as to the manner of staging and driving. Each team of eight



horses, or sometimes mules, is in charge of two drivers, and takes up the coach at one station, carrying it on from 30 to 40 miles to the next, where a fresh team and new drivers await, and the old one rests until the arrival of the coach from the opposite direction. The "guard" accompanies the coach throughout its journey, and looks after the comfort of the passengers. Of the two drivers, the sole duty of the chief, generally a "Cape-boy" or mulatto, is to guide his eight horses by aid of the long whip already mentioned. This he uses like a fly-rod, stinging and nipping each horse in the line as he needs it, at the same time urging him on by name. On the front seat also sits the second driver, a stalwart negro, whose duty consists in silently holding the reins,—no easy task. As far as the treatment of the team was concerned, the whole journey was an outrage upon horse-flesh and humanity.

Leaving Wellington far behind, towards afternoon we began the ascent of the Drakensberg mountains through the famous Bain's Kloof. Tortuous hardly expresses the way—often around horse-shoe curves exactly facing the course of five minutes before—the interspace of the horse-shoe a deep, rocky ravine. Still up we toiled, the road cut into the sides of the mountains—a perfect jumble of peaks they seemed. No fence or guard on the edge, and nothing but the active tip of that long whip to hinder the horses from plunging over, wagon and all.

On the outside of the road stretched a magnificent panorama of mountain, plain, and dotted village of Wellington; on the inside was the black face of the mountain, and by the road's edge a sparkling, crystal stream, fed at intervals by little cascades springing off the mountain's side, while every crack and crevice bore a luxuriance of fern-growth. The top reached, we took our last view of the sea, just visible as a white line. Our descent was precipitous, and always along the edge of the same yawning chasms. But, once down, we made good time, changing horses every 30 to 40 miles, and reaching Worcester, a large, handsome town, with finely shaded streets, in the bright moonlight of our first evening. Then on through the night, and as dawn woke us from our jolted sleep, we found we were skirting the edge of a pretty river, its banks densely wooded and alive with turtle-doves and brightly plumaged birds.

But the scene changed quickly as we entered fully upon the Karoo, a desert hundreds of miles in extent—a desolate, barren waste. The hot, simmering air rises in visible, flickering waves from its over-heated, pebbly surface. No boundaries rest the eye. No sound breaks the oppressive stillness. Little running whirlwinds play with the light, choking dust, or a sudden gust blinds men and horses. Scarcely a plant shows its stunted growth; and, as if to crown the mockery of the scene, suddenly, far in the distance, appear the shining lakes, the little wooded islands, and the promontories of the mirage. No wonder many a traveler has turned aside to verify the cruel delusion. By the roadside, constantly recurring, lie the whitened skeletons of oxen and mules, fallen by the way, and more than one weary foot-traveler to the mines has died on this arid plain. Water and food, as well as, of course a change of horses, awaited us at many appointed stations.

On the third day the Gouph, another desert, and a continuation of the Karoo, was reached. Of many river-beds that we crossed, not one contained water. One saw the worn channel, the rippled sand, and stranded floatwood, as also trees upon the banks, but no water. But in a moment, even while we are crossing, the water may come tumbling, rushing down, and the stream be impassable for days. Such streams are the Bloed river, the Weykeh and the Bitter Water. After crossing the Bloed we reached Uitkyk (translated "look-out"), where came the announcement of five hours' sleep,—a welcome boon to a tired crew who, for four days, awake or asleep, had alternated between seat and

roof of that wagon, or banged against a neighbor's sides until apology was out of the question.

A few words of description of this farm will apply to many scattered at great distances apart along the road. The house was large, one story in height, built of sunburned brick, and surrounded with a veranda. In the vicinity were squalid huts of native laborers. Near by, also, a walled-in garden, artificially irrigated by a network of little canals, and luxuriant in fig-trees, pomegranates, orange and lemon-trees, luscious grapes, and useful vegetables. Entering the house, one finds a large sitting-room, with cemented floor, covered with well-cured skins of antelopes, the chairs adorned with elegant skins of leopards, silver jackals and foxes; perhaps a melodeon, and some prints.

Such an establishment belongs to some rich Boer farmer, who owns thousands of acres, or, one may fairly say, miles of the barren plain—that is, barren as compared with English or American pastures—but, nevertheless, such tracts are covered with a stunted "bush," six inches to a foot high, on which sheep and goats thrive amazingly well, and cattle find a fair sustenance. This farmer's flocks number often as many as ten thousand. His labor is done by natives. The situation of this little settlement depends wholly upon the water supply, and as it rains only during a portion of the year, some slight depression is chosen in the plain where there is a large surface drainage, and a long dam built, to keep the water during the dry season. Such a shallow sheet is called a "dam." The household supply of water comes from this, and to it daily are driven the thousands of thirsty sheep. Should the water fail, or the dam give way, as it sometimes does from the burrowing of the land-crabs, then all the flocks must perish, and men hasten away. In some cases the water secured by rainfall is supplemented by a small supply from a spring, and in the districts beyond the Orange river there are natural basins, exceedingly shallow but broad, called "pans," which also hold water through the dry season, and thus become a chosen site for the Dutch farmer.

Another essential feature of the farm is the "kraal," a circular enclosure, into which the sheep are driven at night to protect them from wild animals. The floor of this enclosure grows hard with the accumulation of years of occupation by so many animals, and is finally quarried, as it were, into square blocks, from which permanent and solid walls are built to each kraal. The same blocks, also, well dried, form the ordinary fuel. At many farms I found that the sheep had at times suffered enormously from hoof-rot—a result, no doubt, of never changing the site of the kraal. The sheep raisers of America, I believe, often change the position of their enclosures.

Our allotted rest of five hours at Uitkyk, which has furnished this opportunity of referring to farms, flocks, dams and kraals, was over at two o'clock in the morning, and we now clambered in for a long stage to Beaufort, still over the same tedious, monotonous stretch of waste, always the same glowing, pebbly surface, scantily clothed in a brown garment of bush.

At one o'clock of this day we entered Beaufort, a large town of perhaps a thousand inhabitants. Things again looked quite civilized as we drove down the hard, level, main street, with trees regularly planted on either side, well-kept sidewalks, and pretty, low brick houses just back from the street. In some of the gardens were huge ostriches, which were squatting upon the ground, or strutting about tame, and kept for their feathers. From Beaufort we pushed on rapidly, making no further stops except for a change of horses and to eat. The passage of two down coaches, sighted like vessels at sea long before we met them, afforded a pleasant excitement. Two days more brought us to Hopetown, a village of about two hundred inhabitants. The houses were built solidly of brick, and looked exceedingly comfortable. The

sight of trees once more blessed our eyes. This town, previous to the discovery of the diamond fields, was the last point in the interior at which were gathered evidences of civilization in the shape of good homes and municipal organization.

Half a mile beyond Hopetown we reached the rolling flood of the mighty Orange river, so named from the color of its water. The stream at this point is at least 300 yards broad, and from 30 to 40 feet deep. Its banks are perhaps 60 feet high, and of mud or sand. The current is exceedingly swift, and plays strange havoc with the shifting banks, particularly as the stream is subject to frequent floods when augmented by rain or melting snows of the Drackensberg mountains, whence it takes its rise. Our wagon was carefully guided down a cutting in the steep bank, and on to a punt or flat-bottomed boat, and ferried across. It was a steep pull up on the opposite side for the horses.

Here long lines of ox-wagons were waiting to be ferried over. The wagon and sixteen oxen are driven on at once. Owing to frequent floods, the river is often impassable for days, and hundreds of wagons collect on either side awaiting its fall.

We were now only a few hours' distance from the mines. On the afternoon of the seventh day all were on the watch for the first sight of the famous Fields, the word "Fields" being a general term applied to the whole diamond-producing region, but for us meaning that part of the district called the "Dry Diggings," in contradistinction to the "River Diggings," twenty-five miles further. As we gained the summit of a swell of ground, before us, only a few miles away, stretched what appeared to be low, yellow hill-ranges, but which proved later to be the earth excavated from the mines of Dutoit's Pan and Bultfontein. Scattered over the plain, and densest at the foot of the sand-mounds, was built a glistening white-roofed city. The horses pricked up their ears as they recognized the end of their last long stage. The road soon skirted the edge of a shallow lake called a "pan," formerly owned by a Mr. Dutoit, whence is derived the name of the town built at one end of it. Crowds of curs of every size and color greeted our entry. We crossed the large market-square, drove down the long main street, and drew up in front of the office of the Inland Transport Company, where a large crowd, gathered from curiosity and desire to get the latest news, awaited our arrival. We have now passed over the real barrier between the diamond fields and the world, viz., the journey thither, a distance of ten thousand miles from New York. We will suppose the traveler established, rested and ready to answer the inquiry of what manner of place it is, first defining his position historically and geographically.

Capetown was founded in 1650, by the Dutch, who gradually extended their possessions to the Orange river. The Cape Colony was occupied by the English in 1806, in whose possession it has since remained. The Dutch grew restless under what they considered the oppressive government of their new masters, and many of them determined to emigrate to the unknown regions beyond the Orange. The principal exodus occurred from 1836 to 1840. At that time 5,000 Dutch colonists, with their wives and families, gathered together their flocks, their herds and their horses, packed all the necessary household goods and utensils into huge ox-wagons, each drawn by twenty oxen, and thus, with their lives and their property in their hand, as it were, braved the dangers of savage, beast and waste, and laid the foundations of the Orange Free State and Transvaal republics.

One party, 900 wagons strong, after two years of weary wagon-life, stood upon the Drackensberg mountains, and looked down upon the lovely Natal. With great toil they let their wagons down the steep mountain-sides, and established their scattered camps or "laagers" on the fresh green meadows. As they pressed to the coast, they came upon a little settlement of the English. A col-

lision of arms ensued, and the Dutch—dispirited, it seems, by the prospect of contention, broil, and servitude to the flag from which they had just escaped—withdraw back again over the Drakensberg to the plains of the unborn Free State and Transvaal. The emigrants thrived, but were not left in peace. The British government still claimed them as citizens, and in 1848 proclaimed their territory to belong to Great Britain, but again formally abandoned it in 1852 and '54, at which time the two republics began their political life, it being agreed by formal and ratified treaty "that the British Government should not interfere between the natives and other inhabitants of the country." For it was thought, and plainly stated, that the Dutch settlers would interpose a useful zone of defense between the old Colony and the wild tribes beyond.

Two rivers, the Vaal and the Orange, take their rise within a few miles of each other in the Drakensberg mountains of the eastern coast and, at first flowing in opposite directions, at length gradually sweep around to the west and unite some 250 miles from their sources. The enclosed space is the Republic of the Orange Free State. The small western angle of this enclosure constitutes the diamond fields of South Africa. Across a mission map of this very tract, printed in 1750, is written: "Here be diamonds." The natives had long used the diamond mechanically for boring other stones, and made periodical visits hither to procure their supply. But the modern discovery came about in this wise: A certain John O'Reilly, trader and hunter, on his way from the interior, reached the junction of the rivers and stopped for the night at the farm of a Dutch farmer named Van Niekerk. The children were playing on the earthen floor with some pretty pebbles they had found long before in the river. One of these pebbles attracted O'Reilly's attention. He said, picking it up: "That might be a diamond." Niekerk laughed and said he could have it; it was no diamond, and if it was, there were plenty around there. However, O'Reilly was not to be laughed out of his idea, and said that if Niekerk didn't object he would take it down with him to Capetown and see what it was, and if it proved to be of value he would give him half the proceeds. Niekerk lightly assented and O'Reilly set off. On the way down, a long journey, he stopped at Colesburg, at the hotel, and showed the pebble, scratching with it a pane of glass. His friends, laughingly, scratched glass with a gun-flint, and threw the pebble out of the window, telling O'Reilly not to make a fool of himself. However, O'Reilly persevered and got it to Dr. Atherstone, near the coast, who announced that it was in truth a diamond of 22½ carats. It was sold for \$3,000. I am glad to say that O'Reilly divided fairly with Niekerk. The latter remembered that he had seen an immense stone in the hands of a native. He found the native, gave him 500 sheep, horses, and nearly all he possessed, and sold it the same day to an experienced diamond buyer for \$56,000. This was the famous "Star of South Africa." The natives now crawled over the ground and found many more, and the excitement grew and became intense. By 1869 parties in ox-wagons had worked their way over the weary plains to the Vaal river. From all parts of the colony and from foreign lands, people swarmed, and soon, like the creation of a dream, a tented city of 10,000 and more inhabitants grew at Pniel and Klipdrift on the opposite banks of the stream.

Diamonds were found plentifully and of excellent quality by sorting over the boulder-drift of the banks. The excited crowds shifted their quarters up and down the river, continually making new discoveries during 1870 and '71. Besides Klipdrift and Pniel, there were crowds of people at Gong Gong, Union Kopje, Colesberg Kopje, Delport's Hope, Blue Jacket, Forlorn Hope, Waldek's Plant, Larkin's Flat, Niekerk's Hope, and numerous smaller places. The Vaal river is broad and beautiful, its banks densely wooded with mimosa and willow, and its course broken by little tree clad islands. With its bed made up of

brilliant pebbles of agate, jasper, chalcedony and quartz, quartz crystals and diamonds, no fabled river of antiquity ever offered stronger food to the imagination. But the tide of fortune was soon to turn into less pleasant directions and assume mightier proportions.

The last stage in the journey to the River Diggings was at Dutoit's Pan. Here in the sand small diamonds were discovered; even in the mud that plastered the sides of the proprietor's house. This soon became known along the river, and now occurred a remarkable "rush" to Dutoit's Pan and Bultfontein, which adjoin each other. Dutoit's Pan is situated on the open plain twenty-five miles from the river. The mine proved to be a diamondiferous area of about 23 acres. The multitude that flocked from the River Diggings was here met by the throngs crowding in from every other direction, and soon a seething population of 40,000 people built up a town around the mine. Old De Beers, a small mine only a mile away, was next discovered. Then came the last, and, up to this time, final discovery of New Rush, or Kimberley, undoubtedly the site of more natural wealth than any other known spot on the surface of the globe. All this time the proprietors of the farms on which the diamonds were being found were utterly helpless to prevent the appropriation of their property. The diggers "rushed" the farms and dug out the mines, dictating such terms as they pleased to the actual owners of the soil.

"Rushing" seems to have been the order of the day, for now the British government stepped in and annexed the whole diamond-producing district. The Orange Free State, in virtue of the treaty I have quoted, owned the territory enclosed by the Vaal and Orange rivers—the treaty itself defining these boundaries. A petty Griqua chief, Waterboer by name, dwelling by sufferance within these limits, set up a claim to the diamond region and asked the protection of the British Government. The government answered by formal proclamation in 1871, annexing, under the title of Griqualand West, what it had as formally abandoned and ceded to the Free State in 1854. The injustice of this annexation was long and sturdily contended by the Free State, but to no purpose, until the recent scheme of a confederation of all the South African States under the English flag, was brought forward by Earl Carnarvon, Colonial Secretary of England. This proposition the Free State refused even to entertain until her wrongs were adjusted. Mr. Froude, the eminent historian, was sent as general commissioner, and the matter was finally settled by the payment of \$525,000 indemnity. Griqualand West, with its diamond fields, thus remains an English Crown colony; and the Free State can listen to plans of confederation.

We have thus far followed the digging population from the River Diggings of 1869 and '70 to the Dry Diggings of Dutoit's Pan, Bultfontein, Old De Beers, and Kimberley or New Rush. Here, then, within a radius of a mile, is the heart and focus of the diamond-producing industry of South Africa—or, rather, of the world. Each town is built around its own mine. Three, Dutoit's Pan, Bultfontein and Old De Beers, no longer enjoy their palmy days; still retaining, however, a fair population. The diminished price of diamonds as the market became flooded, the increased difficulties of working, as the depth increased, and, above all, the short-sighted policy of allowing the soil which should have been removed entirely out of these mines, to accumulate within them and choke up the unworked portions, have been the principal causes of their abandonment, as well as of the general diminution of population at Dry Diggings; and practically at the present time all the labor and energy devoted to the search for diamonds is centered in the fourth town, that of Kimberley, which may be said to contain the crystallized result of all the "digging" experience of the diamond fields.



To it let us direct our attention. Here is a city in the desert—dropped at random, as it were, from the clouds, so detached does it seem from all the ordinary surroundings of civilized communities. A city built of tent-cloth, corrugated iron and wood, with here and there substantial brick. As the traveler approaches from afar the sea of buildings seems to lie flattened out upon the ground, since they are all of one story only in height; their broad roofs, whether of canvas or iron, glistening white in the burning sun. Not a tree is to be seen, nor does a single tall building break the white, flat-roofed monotony. But from whatever direction one comes from the surrounding plain, the most prominent sight is the lofty range of sand-mounds, rising out the centre of the town, and overtopping everything. This we know to be the soil which has been excavated, wholly by hand-labor, from the original surface—thirteen acres of the Kimberley mine—and thrown up around the edge of the gradually deepening pit, just as on a smaller scale the ant piles up a circular ridge around its hole.

On the outskirts of the town are seen the squalid huts of Hottentots or Korannas, or the simple tents of the humble diggers. Here, too, rest many of the Colony ox-wagons—such as would be called in our west prairie-schooners—anchored, as it were, for months, affording home and shelter to families who have come in them to make their fortunes, but have not yet been sufficiently successful to build a house. And here begin the undulating mounds of blue clay, many of them as large as the houses, carted from the central mine to the “compounds,” or enclosures of the different searchers for diamonds, and already examined and abandoned. Further inward the mass of buildings appears confusing, but as the traveler proceeds confusion yields to a rough sort of order. Long and straight streets, with numerous cross-streets at right angles, map out the way. What appeared at a distance a clump, becomes defined into an orderly arrangement, and the astonished visitor finds himself traveling along a pleasant way, on either side of him a succession of small, fenced-in plots or freeholds, each with house, outbuildings and garden. A thousand and more independent homes greet his eye, each with the stamp of the individuality of its constructor upon it. This one of corrugated iron, that one of canvas, another of wood, another of brick, but all with veranda or portico, and perhaps a growth of creeping plants; anon an immense pile of corrugated iron constructed into church, theatre or public hall. At last the space between the buildings disappears and they stand side to side. We are now in the purely business part of the town; every door that of a diamond buyer’s office, a “canteen,” corresponding to our drinking saloon, or a well-furnished store. This heart of the town lies round about the mine.

The streets present a novel scene of life and animation. People move about with energy and a purpose, activity and industry imprinted upon their faces. The two-wheeled vehicle, or cab, flies by with its hurried occupant. Dog-cart and spider (the colonial term for our American buggy), are everywhere to be seen. Many persons are on horseback. The big colony ox-wagon, with its sixteen oxen, dusty “voor-looper,” or leader, and driver armed with his long whip, trail along the street, just up from the sea, perhaps a two months’ weary journey, or down from some neighboring farm, laden with delicious grapes, figs or oranges, for sale by the wayside. Carts bearing loads of freshly-excavated soil from the mine, or returning thither, pass and repass all day long. Between Kimberley and Dutoit’s Pan, a distance of two miles, sixty passenger-carts ply for hire daily; and these carts earn at least \$10 per day each, on an average. That is to say, the public spends \$200,000 a year in traveling between these two towns alone. A stream of foot-passengers lines the side-walks, while along the centre of the streets crowds of naked negroes, often singing their weird songs, go to and fro from their work; or perhaps a gang of “raw” natives, just down

thousands of miles from the countries to the north, dusty, thin as skeletons, foot-sore, dirty and strange, with barbaric utensils and ornaments, thread their way along, hooted at, and pelted with dirt and stones by their already initiated countrymen. This reception of the neophyte is of daily occurrence, and the ear can readily follow the direction pursued by the entering band by listening for the succession of derisive yells which greet it at each step of its progress.

The negro—certainly at first—attracts the newly arrived traveler's attention. And once and for all, it is well to banish from the mind the idea that the negro of South Africa looks like the black man as known to us here in America. Our former slaves are descended from a much inferior race. The native at the diamond mines belongs to a superior and dominant type, called, in general, Kaffirs, who have overrun and conquered the territory south of the Zambesi river from the Hottentots and Bushmen. They are, physically, splendid specimens of humanity, walk erect and with careless freedom and grace, go quite naked, except for the waist-cloth and swinging blanket for cool nights. Their simplicity and good nature is refreshing, while their bravery, even against well-disciplined troops, is a matter of history. Everything the white man wears is to them in the light of ornament, and it is a study to watch the merry crowd file along. One stalwart fellow wears only a vest; another has found and put on an abandoned tall hat. One wears a gaiter-boot, or old shoe, picked up by the road-side, or a long stocking and no boot, or simply a shirt. Another struts proudly by in the bright-buttoned uniform of a soldier's coat, his brown legs in marked contrast to his bright red. Every cast-aside paper collar is seized and donned, and all this soberly and demurely, and in ignorance of its comicality.

The native laborer comes mostly from a region of teeming population, between 16° and 22° of south latitude—that is to say, from the country between the Zambesi and Limpopo rivers, beyond the northern border of Transvaal republic. As a fair sample of the tribes represented, I quote the returns of the Native Registry Office, at Kimberly, for the month of March, 1876; Mahowas, 1,086; Makalakas, 19; Batlapins, 170; Basuts, 186; Baralong, 5; Bechuana, 85; Shangans, 142; Colonial, 4; Griqua, 3; Zulu, 123; Koranna, 4—total, 1,827, registered for a month. However, the number registered is, as a rule, probably not more than one-half, as it has never been possible to enforce the law requiring registration. These natives have been pouring in crowds into the diamond fields for seven years, at the rate of 30,000 a year; each gang of from thirty to forty men, after a journey on foot often of 1,000 miles, during which many of them die from starvation and cold, remaining and working only about three months—just long enough to supply each member of it with gun and ammunition—and then returning to their land. They carry back no money, but simply a gun; and they come for nothing else. The English government permits the sale of guns to them indiscriminately; and it is a well-established fact that 300,000 have been thus disposed of.

These natives declared war upon the Transvaal government a few months ago, and we now see what all this preparation meant. There are not wanting observers, even in English circles, who assert that this war has been incited by British settlers in the gold fields of the Transvaal, and who deprecate in the warmest terms the indiscriminate sale of arms to the natives, to be turned against the pioneer, whether he be Dutch or English. The defeats of the Dutch in this war have been announced prominently; and we are told again and again that the little republic must sue for the aid of British protection to save its very existence. With the feelings of the Free State assuaged by the indemnity, and the Transvaal in extremity from war, it would seem as if both might wheel into line under the new confederation. The idea is grand, and would give to England her queenliest colony. But I know the mettle and the temper of the Dutch



farmer too well to believe that he will ever stultify the record of his fathers; he abhors British rule, and has braved every danger to escape it. Like ships caught in an Arctic ice-floe, the two little republics are now quivering in every timber, fringed around as they are with dangers and misrepresentations of British diplomacy. We should not be Americans if our sympathy did not go out warmly to them.

If we now proceed with our inspection of the town, we shall find, upon a more intimate acquaintance with it, that it has a very agreeable society; that there are five large churches and a Jewish synagogue, two theatres, a fine club, and schools. We shall find good tailors, and ladies' and gentlemen's outfitting stores, and it is a fact that the milliners of Capetown, which is notably a gay city, reserve their best ball-dresses, laces and other goods, for the ladies at the diamond-field market. There are three sound banks, numerous hotels, and drinking saloons innumerable. From the open doors anywhere may be heard the sounds of pianos. A fashionable society keeps up all the observances of social life—makes calls, goes driving, gives evening dinners, and now and then a large ball. Dress-suit and society paraphernalia are indispensable. A line of telegraph connects the town with Port Elizabeth and Capetown; and even the modern skating-rink, with latest fittings, has found its way there. Carrying weapons is unknown, except, perhaps, in a night ramble. Violence and robbery are infrequent, and meet with prompt punishment in the courts. An abundant supply of negro labor allows men of education and capital to engage in the occupation of "digging." This word must, therefore, be disassociated from its conventional idea of roughness and lawlessness.

The population may be roughly divided into 4,000 diggers, 2,000 buyers and sellers of diamonds, and 2,000 engaged in other pursuits, such as trades, store-keeping, etc.

Such is a general view of the diamond city of Kimberley—a city which has even now a white population of 8,000 and from 10,000 to 15,000 blacks. In the immediate neighborhood are also the towns of Dutoit's Pan, Old De Beers and Bultfontein.

And this is the marvel of the whole sight: that every piece of timber, every sheet of iron and tent-cloth to build these houses, as well as their contents, of furniture, piano, billiard table and utensils, and more, much of the daily food, has been dragged on ox-wagons from the sea-coast up over the weary desert.

After the visitor to our Centennial Exhibition had made the rounds of the vast Machinery Hall, and met at every turn its thousand little independent machines, all deriving their motion from an unseen and central force, it was at last a relief and a satisfaction to stand before the mighty Corliss engine, and see the throbbing centre which animated the whole outlying net-work around it. And the visitor who thus far has seen only the town-life around the mine, and approaches leading to it, may well feel some curiosity to penetrate to the heart of the whole fabric.

Almost any street leads to the mine. We ascend the mound of sand which surrounds it, and walk to its edge, or as near as we dare, for one glance down makes the strongest-headed withdraw to make sure of his balance and secure a good hold. Before and beneath us lies an abyss—a mighty oval-shaped cauldron, open full to the skies. We look over its edge, down a sheer descent of 200 feet, as deep as the Palisades along the Hudson, and across from side to side a thousand feet, or a fifth of a mile. One stands bewildered and a little dazed at the *volume* of the view, if I may so express it. There are ravines and cañons hundreds of times deeper and broader, which cannot create a like effect. There are hills higher than the pyramids, but we look upon them unmoved. We are used to the wonders of nature, but we have not seen a creation of human hands of

this magnitude. We do not view a completed monument of human industry standing in silence and solitude, but we are looking at an act of creation—hands are warm upon us—it grows before our very eyes. Little by little the facts unfold and steal upon the attention. One finds that he is talking to his neighbor as to a deaf man, for a steady roar of blended Babel fills the air. It is the hum of human voices and the whirr of buckets ascending and descending on their wire ropes. Ten thousand men are working below and around us—five thousand down in the pit and five thousand around its edge. As one looks down, all is in plain sight, for there is no burrowing under ground. Far below, little black pigmy men—so they seem in the distance—are moving about, but not singly or at random, for closer observation shows that they are working in groups, each group upon a certain well-defined square patch of solid earth, at which they are picking and delving, or walking to and fro over it, carrying little buckets of loosened soil. In their midst stands a white overseer, or the master himself, a silent observer and director of all their work. Spreading over the whole excavation, pit, cauldron, pot or basin, whichever conveys the clearest idea—like a spider's web on a dewy morning—run innumerable little white threads, so they seem as they glisten in the sun. Follow one such thread to our feet, and it will be found to be a shining wire rope, worn white with constant use. But, to understand more thoroughly the sight before us, we must go back a little in its history.

Six years ago nothing distinguished this spot from any other on the level plain of the semi-desert. A small party of prospectors went out from Dutoit's Pan, and scratching about in the sand under a tree, where now is the center of the mine we have just been looking into, found a few small diamonds. Straightway from Dutoit's Pan, from Old De Beers and Bultfontein, occurred what is called a "rush" to the new mine, whence "New Rush," one of its present names, though better known now as Kimberley. The Diggers' Committee, an influential elective body, had made it a rule that when such a rush occurred, each individual might mark out for himself with stakes a "claim" of 31 feet square, the discoverer of the spot having two such claims. The boundary lines were then accurately measured by a surveyor, and thus, once established, held good all the way down. The three mines previously discovered had been found to be situated at gently rising swells, called by the Dutch a "kopje," or little hill, and this last proved no exception to the rule. All round the top of this kopje, over perhaps a space of twenty acres, pegs were driven in, marking out each man's property or claim of 31 feet square. It only remained for each to work at it steadily, and pay a tax of \$2.50 per month, to be absolute owner of his claim.

With previous experience as a guide in the new mine, a rule was made and enforced that every particle of earth loosened up should be carried out of, and away from, its borders. To secure this object, roadways crossing all the claims were at first left intact. The soil proved unexpectedly prolific in diamonds. At first it was a fine, red, alluvial sand, such as covered the whole country about, and from which bricks are made to build the Boer farm-houses, the same red soil forming the cement for walls and floors. When two to four feet of this layer had been carried away, a layer of chalk-nodules and chalky clay was reached. These nodules also contained diamonds, but were so excessively difficult to break that the digger, in his haste and excitement, threw them aside; and they lie in forgotten heaps about the mine still unbroken. I have seen a large white diamond embedded in one of these chalk-nodules which had been broken by a heavy hammer. Under the chalky layer came a brittle, yellowish-white mass of soft rock; this, too, quite rich in diamonds, and easily workable. But as the basin deepened, it was found to have a regularly defined edge of talcose shale, rising like a cliff all around. Beyond this, that is, outside it, no dia-

monds could be found, and it was, therefore, left undisturbed, receiving the name of the "reef." When digging was superficial, no one knew where the reef was, and of the many claims marked out at first, only those were of value which came within the area thus defined by a natural wall. In short, the diggers found they were working out a pocket of about nine acres in extent.

It will make the nature of the reef plainer to state that wherever one digs a well or other excavation, either quite near to the mine or a hundred miles away, he finds under the chalky layer above described exists a layer of this soft, stratified shale, from twenty to thirty feet in depth. But over the mines or diamondiferous pockets no such layer exists. Some force from below or above has punched a hole out of this crust, leaving the round basin with edges accurately defined by the ragged edge of shale. The contents of the mine, or pocket—*i. e.*, the diamondiferous conglomerate soil or rock, lie pressed up against the reef, fitting into its every undulation, depression, seam and crevice, as closely as hot lead would have adapted itself to the same mould.

Work under the intense excitement went on with wonderful rapidity, when one considers that all the soil removed had to be drawn up in rough buckets of ox-hide, which contained hardly two shovelfuls of earth. And soon, at a depth of from fifty to sixty feet, a very solid conglomerate rock was reached, of a gray-blue color, which received the name of "blue stuff." Immediately at sight of this layer, the cry of "Hard-pan!" was raised, and many sold out their claims at a loss. But the blue stuff, though harder and tougher than any layer before met with, proved also to be very rich in diamonds, and work into it was pushed on with vigor. In no other mine had this hard layer been attempted, though it existed in the same relative position, because either the diggers had not gone so deep, or water had trickled in and filled their claims.

By this time a single claim, of 31 feet square, had become worth from \$5,000 to \$40,000; \$20,000 was not an unusual price to give. There were over 400 full claims left within the circling folds of the reef. But their numerous subdivisions to halves, quarters, eighths, and even sixteenths, made at least 1,600 independent focuses of labor on the floor or bottom of the mine, for floor it can hardly be called, since it is far from level. People dug fastest in sections of the mine which paid best, whence it resulted that the whole outer circumference of the basin was worked down much deeper than the centre. Again, individuals differed much in energy, whence it followed that each little patch or portion of a claim was worked out to different levels. Thus both causes conspired to make the bottom of the mine most irregular in appearance; here a turreted block rising high in air, and there a hole, yet always preserving a checker-board appearance of lines and boundaries, all at right angles. From week to week the effect of work thus irregularly applied was singularly kaleidoscopic. Let a few days pass, and where stood a tower was an excavation, and where once was a level floor rose a mighty square-hewn pile. The roadways, eleven in number, had long since been dug down to the general level.

Retaining plainly in mind a hollowed-out oval pocket 1,000 feet long, 700 feet broad, and 200 feet deep, we turn to its upper edge or brim, called, as we know, the reef, and find there a scene of life and labor even more animated than below. All around the edge, but chiefly on two opposite sides, is erected a strong framework of timber called the "staging," estimated to have cost \$250,000. It is built in three tiers, like a three-story house, and each tier is floored, to afford standing room for laborers. Firmly set all along each tier of this staging are hundreds of wooden wheels, about four feet in diameter, with a crank on either side, to be turned by four Kaffirs. The iron ropes to which I have alluded as forming a net-work over the mine, run from every part of the circumference, but differ greatly in length—some extending vertically down the

reef, some far out into the centre of the mine, and others to varying intermediate distances, but each to its own claim. Such a rope is stretched from the bearings of each wheel on the staging to its corresponding claim below, where it is made fast to a post sunk firmly in the ground. Thus, a wheel, a wire rope and a claim, be it only a sixteenth, are inseparable, and equal in number. The blue stuff is difficult to loosen from its bed, but this is effected by repeated blows from a very sharp pick, or, where it is exceedingly hard, by driving in long wedges, and thus splitting off pieces. Blasting has been resorted to but little, since its effects extend into other people's claims.

Two Kaffirs, all day, will pick loose as much as four at the wheel above can pull up. A working gang is thus distributed for the day: below, in the claim, an overseer and four Kaffirs—two to pick, and two to fill the buckets which ascend and descend on the wire rope I have just described; above, on the reef, are six Kaffirs—four to turn the wheel or windlass, one to receive the ascending bucket laden with diamondiferous soil, and another to carry it back a few rods and empty it at a depositing place. This makes a gang of ten, though twelve can be used to advantage, and in this manner from eight to ten cart-loads can be hauled up and out in a day.

Most of the large diamonds, those from 20 carats upward, are found during the picking down in the mine, owing to the fact that the cement-like blue stuff fractures or splits most easily through the spot occupied by any hard pebble such as the diamond. It is here, in the claim, that many diamonds are stolen by the negroes, who are as adroit with their toes as with their hands, and will walk about all day with a diamond held in their foot. Instances of their cleverness are often coming to light. For instance: a digger was ill, and sent his brother down to watch the picking. Being a new hand at this duty, he watched very closely. On returning at night he reported: "No luck whatever; not a chip, and I watched them close." Shortly after, the head Kaffir came up to his "baas," or master, who was ill, and handed him nine small diamonds, saying, as he pointed to the brother who had watched him all day, "He no my baas."

If the Kaffirs mean to steal, it is almost impossible to stop them. Diamonds get into their mouths, ears, and smoking-pipes. They swallow them; or, if the diamond is very large, and is not seen by the overseer, they leave it where it is, covered up with loose soil, and return for it in the night. A Kaffir was seen beyond any chance of mistake to put a diamond into his mouth. He was immediately seized and carefully overhauled, but no diamond could be found. There were no hollow teeth and no unusual cavities. The master began to doubt his senses. But upon tying the Kaffir over a barrel and administering a few sharp blows, a beautiful gem rolled out of his mouth.

The digger's work is only half done when he has got the blue stuff out of the mine. It is next carted to his "compound," where the diamonds are to be extricated from it. But first, a few words as to the nature of the blue stuff, a term necessarily used frequently. The character of the diamondiferous ground is identically the same in all of the four neighboring mines. It appears to be a pudding-stone formed in water. Its general character is that of a soft pulverulent ground-mass, composed of a mineral soapy to the touch. In this ground-mass are interspersed fragments of shale, round water-worn pebbles of trap, agate and jasper, bronzite and smaragdite, garnet and ilmenite, hyalite and hornstone, calcite and diamonds. The rock is thus described\* by Prof. Maskelyne, who has examined specimens of it: "The analysis of the several minerals composing the rocks will be seen to exhibit this once igneous rock in the light of a bronzite rock, converted, except where the remains of crystals have still survived meta-

\* Quart. Jour. Geological Soc., No. 2, 1874.

morphism, into a hydrated magnesium-silicate, which has the chemical character of a hydrated bronzite. It is probable that the calcite is an infiltrated ingredient, and that the silica has been imported by the agency of water." If this rock is dried thoroughly in the sun for several weeks, and then wet with water, it falls to pieces into a soft, slimy, muddy mass, which envelopes the varied constituents enumerated—a fact which is put to most practical use in separating out the diamond. Diamonds are scattered with remarkable evenness throughout this conglomerate. Two are never found together or even near each other.

It is not here the place, nor is there time, to enter into any of the theories of the formation of the mine or of the diamond. Certain it is that the diamond was not formed where it is now found, for every variety of fragment occurs, as well as the perfect stone, imbedded alike in the conglomerate. A half-stone with ragged edges of cleavage was certainly never crystallized in a casing which surrounds all its fractured inequalities. The second half of a split stone is never found. Evidently the diamond is only an accidental ingredient of the pudding-stone, and its true matrix remains to be discovered. In regard to the mine, the favorite theory is that of a mud volcano, of which it was the throat or pipe, and that the contents result from the decomposition of an original rock below which contained diamonds. A strong point in favor of this theory is the fact that the diamonds of each of the four mines are characteristic of it, and their locality generally recognizable. We must dismiss this point here, only observing that there are many facts wholly unexplained by this theory, such as the existence of diamonds in the different layers on the top, and the presence in the conglomerate rock of water-worn agates, chalcedony and other polished pebbles.

Certain claims consist of almost a solid mass of pebbles containing just enough cement to hold them together. These pebbles are all rounded; also, the ilmenite, or titaniferous iron-ore, is in most instances found ground down to nodular pieces of the size of a marble, with smooth surfaces. I can only here suggest, by drawing attention to the water-worn character of many of the ingredients of the conglomerate, the consideration of a theory which has not yet been advanced, namely, that of glacial agency.

The "compound," to which the diamondiferous soil is carted, is a most interesting place, signifying in general a private plat of ground, fenced in or not. It is in reality the digger's home. Here he erects a simple tent or builds a permanent house, with tents for his Kaffir workmen, whom he generally feeds, and stables for his horses. He digs a well, sets up his washing machine for diamonds, and gathers about him a host of windlasses, runners, buckets, shovels, picks, sieves, old wire rope, and odds and ends of digging tools.

Next in importance to his house and his well is the "floor," or "depositing ground." This is simply an earthen floor, beaten down hard by constant walking and working, and kept as clean as any household floor. Upon its brick-red surface a diamond the size of a pin's head would be readily seen. Here the blue stuff from the mine is dumped from the carts, and now another gang of ten Kaffirs is required to work it over. In the early days the rock was broken by clubs to a fine mass, passed through sieves, the coarse residue put upon impromptu tables and sorted. By this process, diamonds less than a carat in weight were lost.

This was the universal practice for three years, until 1874, when the method of separating by means of water was introduced—a step which, next to the original discovery of the diamonds themselves, was the most important event in the life at the Fields. For three years the piles of siftings had accumulated, forming great mounds all over the town, which were known to contain many diamonds, but equally well known to be unremunerative if worked over by the usual dry process. It was a time of considerable commercial depression, and a large crowd of men were out of both capital and work. The washing machine introduced



new life into the whole community. The owners of claims in the mine adopted it, and soon every abandoned pile was beset by crowds of eager workers, who, in some instances, bought the right from owners, or in others appropriated such mounds as they found unclaimed. It was difficult to save the streets from the assiduity of the washers, and many a front yard, laid down deep with dry, sorted soil, now became of new and great value. I remember one family who took up the floor of their house, which was originally of claim-stuff sorted over once, and found, by washing it, enough diamonds to give them a new start in the mine. The washing process flooded the market with very small diamonds which had before escaped, though even now, so rude and incomplete is the method, all diamonds of the size of a pin's head and under are lost.

All the machines are constructed on the general plan of puddling—*i. e.*, reducing the mass to the consistency of thin mud, and then by agitation allowing the thin parts to run off and retaining the heavy portions of garnet, iron-ore and diamond. The machine in common use is the simple cradle with ripples; the cradle is rocked and the mud runs over the ripples, while the diamonds, being of superior specific gravity, are caught by them. According to the machine, six to twelve cart-loads can be washed per day, leaving a heavy residuum of perhaps a bushel of garnet, ilmenite and iron-stone pebbles, which must be sorted over by hand for diamonds. The cost of such a machine is about \$60. Another puddling machine does its work in a circular trough, by means of iron teeth kept constantly moving around in it by horse power. This latter machine washes about twenty-five to thirty cart-loads per day. Its cost is about \$1,000. A still better, but more expensive, machine has been invented, but its high cost places it beyond the reach of any but companies.

Diamond digging is expensive. We will take, for example, the average digger who owns a quarter of a claim and works his own ground. He can take his choice, according to locality, of paying from \$1,000 to \$10,000 for his quarter-claim—*i. e.*,  $7\frac{1}{2}$  feet by 31 feet. It pays best to buy high-priced ground. His outfit of digging tools, washing machine, etc., will cost, say \$1,000. He requires a gang of 20 Kaffirs, which will cost him \$5 each per week, or \$100. One overseer besides himself, \$25 per week. Meat and tobacco for Kaffirs, \$5 per week extra. Then expenses of carting and taxes will make his total outlay at the least \$200 per week or over \$10,000 a year, exclusive of his own expenses of living. An arrangement much in practice is for the owner of claims to let out his ground on percentage. In this case the working expenses are the same, but are borne by the lessee, who retains from 60 to 70 per cent of the value of diamonds found for his share, and pays to the lessor the balance of 40 to 30 per cent. Practically, if a man is not prepared to spend \$800 per month, I believe it is of no use to go to Kimberley to dig for diamonds.

To offset this expense is, of course, good luck in "finding," and from the first moment of beginning operations the digger often not only clears expenses, but makes a handsome profit. The rub is to dare to begin and to dare to fail. There is no doubt that diamond digging pays two-thirds of those who engage in it well. The fortunes made, as a rule, are small and numerous. Rarely has any one cleared \$50,000 from any one claim. Success seems to be very evenly distributed, and chiefly attainable to those who can begin with a small capital—say from \$3,000 to \$5,000. The amount of money paid for Kaffir labor alone is enormous. For instance, there are a thousand wheels; allowing five Kaffirs to each, we have 5,000 laborers daily at the mine. These, at \$5 each per week, are paid \$25,000, or \$100,000 per month, or \$1,200,000 per year, and this for 5,000 Kaffirs only. The assessment of the Kimberley mine for the year 1876, simply for the purpose of distribution of rates or taxes, was \$5,151,500, or about \$7,000,000, if we add a third to bring the first amount up to selling prices.



And now a word about the Cape diamond. In general it contains yellow coloring matter, ranging through every shade from deep orange-yellow to the faintest straw-color. But there are also stones as white as any from India or Brazil. With regard to the degree of yellow coloring matter contained in them, they are thus ranged: white, Cape-white, bye-water, off-color and yellow. A few milky white are found, now and then pale blue, and even blue, but never as yet of large size. Brown and pink are usual and common, next to the off-colored or yellow, and not much esteemed. Small green stones are also seen. Black and perfect I have never seen, but black and fractured are very common.

There is no "carbon" or "black diamond," such as is found in the Brazilian mines, and which is used now so generally in the various diamond saws and diamond drills. The Cape carbon, so called, once imported in large quantities, under the impression that it was an imperfect form of the diamond crystal, and could be used for cutting purposes, is simply ilmenite or titaniferous iron-ore. Cape "boart," the nearest approach to true carbon, is of a crystalline, brittle texture, and not sufficiently tenacious to be of use in saws and drills.

The yield of Cape diamonds may be thus classified: 10 per cent., first quality; 15 per cent., second quality; 20 per cent., third quality; and the remaining 55 per cent. consisting of boart, used for cutting diamonds and other stones.

A curious fact is the "bursting" or "splitting" of a diamond. This occurs only to "glassy stones," which have—be it ever so faint—a tinge of brown in them. They are usually perfect octahedrons, with little beveling at their angles, and are of much harder quality than others, except the black, which seems to be an advanced stage of the same conditions. Such a stone comes clear and brilliant from the mine, and perhaps in an hour a little "feather" or fracture points towards its centre; or, laid aside for the night, it is found in the morning lying in fragments. The splitting is due, probably, to the water absorbed between the laminae having dried out. The diggers wrap such stones, as soon as found, in cotton, or put them in oil until the moment of offering them for sale. Glycerine would probably answer better.

The Cape diamond has no adhering skin or envelope, as is the case with the Brazilian. It shines like a piece of bright glass wherever it is found. There is, to be sure, a delicate film of infiltrated calcite about those imbedded in the blue stuff; but this film adheres to the imbedding rock, and not to the diamond. Almost every modification of the system of crystallization to which the diamond belongs occurs except the cube. Octahedrons, either perfect or beveled, are the most common. Perfect dodecahedrons are not unusual. Twin stones, macles and agglomerations of tiny crystals occur frequently. One specimen of a geode or hollow diamond has also been found.

The diamonds from the river and each of the four mines have recognizable peculiarities. Those from the river are invariably water-worn, looking more or less like ground glass, and noted for being whiter than any other. They bring the highest price. Stones from Dutoit's Pan are in general large, and off-colored and yellow. Bultfontein has a totally different kind of stone. It is a small beveled octahedron, and "pocked" or pitted, giving it a frosted appearance; while Kimberley has, as a rule, not as large diamonds as Dutoit's Pan, but whiter—also a larger proportion of split, flawed and spotted stones and boart; never a frosted stone. It is also remarkable, but beyond question of doubt, that two sections of the Kimberley mine yield quite different diamonds. In the West End, so called, are found only the glassy stones, regularly formed octahedrons, generally of excellent white color, while elsewhere the stones have rounded and beveled edges, and more of them are off-colored. The color of the diamond and its form of crystallization have some remarkable and unexplained association. The popular notion that the Cape diamonds are *all* yellow or off-colored, is a myth—many are white.

The total yield of diamonds from the Cape mines to the end of 1876, has been estimated at \$85,000,000, a sum calculated from shipments known to have been made. But both digger and diamond buyer carry home privately large packages of diamonds whose value would much augment this amount.

The diamond fields are situated upon the vast plateau of southern Africa, which has a general elevation of 5,000 feet above the level of the sea, and has a most agreeable and healthy climate, though the absence of trees and running water might at first give an impression to the contrary. The average register of the aneroid barometer is 26.50. In January, the hottest month, the average maximum temperature for the day is 90° Fahr., the minimum 50°, and in July, the coldest month, the average maximum temperature is 70°, the minimum 30°; a range of 40° for each season. The nights are always cool. I have no means of ascertaining the rainfall. It is sufficient to clothe the veldt in a moderate verdure during eight months in the year—from September (spring) to May (autumn), but not sufficient to make gardening practicable, except by aid of artificial irrigation. Thunder-storms are severe, and the water falls in sheets. Dust-storms are a frequent source of discomfort.

The rate of mortality in Kimberley is exceedingly small. It is not officially reported, but I quote from the mortality register for two extremes of seasons, January (hot) and August (cold). In January there were 9 deaths, and in August 20. More people die from the effects of careless exposure in the winter months of July and August than die from diseases incident to the heated season, which speaks volumes for the salubrity of the climate. It is a very remarkable fact, and one that I have not seen commented upon, that rabies and hydrophobia are unknown in southern Africa. No better opportunity for confirming this observation could exist than in the diamond-fields communities, where every man, woman and child owns a dog. Unruly curs are kept in almost no restraint, and by night are the greatest nuisance and danger in the town. People are constantly bitten by them, and yet, during my two years' residence there, no case of hydrophobia occurred, and I believe there has not been a recorded or reported case in the whole colony. If a man was bitten he simply remarked, "Well, they don't have hydrophobia out here, so it is all right." The same absence of rabies and hydrophobia is noted in Tasmania and Guiana.

It apparently never occurs to the digger to inquire into the unstable nature of the whole Kimberley fabric. Immense sums of money are invested in and around the mine, and owners of town lots, of houses, of public buildings, and of claims, have settled into the calmest feeling of security.

But a chance as fickle as a puff of wind may at any moment ruin the whole community. For, supposing that the mine is *not* a volcanic pipe, but only a rift or chasm filled in by glacial debris, or even hollowed out by glacial action—then the pick that strikes hard-pan shatters every man's fortune. Or the same pick may tap a spring and flood the mine with water. But no such fear disturbs the digger of Kimberley. His belief in the immortality of the mine is supreme. Yet in spite of his confidence, there are influences at work which are crowding the small capitalist from the fields. The increasing depth, crumbling reef, inflowing water, are fast multiplying the expenses of working. The great bugbear of the digger is the word "company," but even now small proprietorships are becoming merged in large aggregations of claims, and the next phase of mining operations must undoubtedly be that of several large and competing companies, or perhaps a single one controlling the whole mine.

Then the romance of individual diamond hunting will be over. But there is no danger that the diamond will ever become common. The world's supply, as far as known, for the future, is sparsely scattered in the depths of a seven-acre mine. Nature has placed the diamond in lands difficult of access, and it is likely to remain a royal gem, surrounded with the seclusion of royalty.

## SOME GEOGRAPHICAL FEATURES OF CALIFORNIA.

By J. A. JOHNSON.

With a map of the United States thrown upon the screen, the lecturer first contrasted the size of the state of California with that of the states occupying the same parallels of latitude on the Atlantic coast, showing that it takes the states of Connecticut, Rhode Island, a third part of New York and Pennsylvania, the whole of New Jersey, Delaware, and Maryland, the greater part of Virginia, North Carolina, and South Carolina, and a portion of Georgia to make one state the size of California on the eastern coast of the Union. California was about 700 miles long by 200 miles wide, being nearly a third larger than Italy, and but little smaller than Spain or France. It possessed a vast variety of soils, productions, climate and scenery, with strongly-marked geographical features. With the map still before the audience, he then gave a general description of the state. There were six great natural divisions of its territory; the northern two-thirds consisting of the Sierra Nevada range of mountains, the great central basin of the Sacramento and San Joaquin rivers, and the Coast Range of mountains, with its foot-hills on the coast; the southern third-part, divided nearly in the center from north to south by the San Bernardino mountains, with the Mojave and Colorado plains on the east, and the great valleys or plains of the Los Angeles, Santa Anna, and other rivers on the west.

The Sierra Nevada range is about 60 miles in width, on an average, and nearly 500 miles in length, and occupies the eastern side of the state. The great back-bone of this range is granite, gray in some portions, light yellowish in others, as at the Yosemite and elsewhere. The elevation of this range varies from 5,000 to 8,000 feet. There are many lofty peaks, some of them 13,000 and 14,000 feet high. The western slope comprises more than seven-eighths of the entire range, the eastern slope being abrupt and broken, and terminating upon a great basin having an elevation of 3,000 to 4,000 feet above the sea-level. The western slope is mostly covered with timber, the famous coniferous trees growing on the upper slope, from a height of 6,000 feet on down to 2,500 feet, and from thence to the valley the nut-pine, the oak, and the manganita are found. The most valuable gold mines are located on this western slope, at an elevation of 2,000 to 6,000 feet, and covering an area about 40 miles in width and 200 miles in length; but gold mines are also found in many other parts of the state. The auriferous lodes which have been mined at a profit are all of quartz, the veins varying in thickness from one inch to 30 feet, usually running parallel with the range and dipping toward the east. The silver mines occur mainly on the eastern slope, and in Nevada on the east. In the foot-hills of the western slope are found a great variety of valuable building stones. A fine white marble, nearly equal to the best statuary marble, and a very beautiful mottled and striped marble, closely resembling the famous stone known as Mexican onyx, also some very fine gray limestone and excellent slate, are found in these foot-hills. The lower third-part of this western slope, usually called the foot-hills, is destined to become the great fruit-belt of the State, though at present it is little prized and has only been cultivated in patches; the fruit is uniformly excellent and equal to the best produced in the State. The climate of this region is excellent, and is only surpassed by that of the more favorite localities of the southern coast-counties.

The great central basin of the State, the united valleys of the Sacramento and San Joaquin rivers, averaging about 50 miles wide and 400 miles long, and lying between the Sierra Nevada and the Coast Range mountains, may be called the wheat-field of California, though all the other cereals are produced there, as well as in other parts of the State. The soil generally is a sandy loam, though clayey soils are found all over the valley. The climate is hot in summer and subject to moderate frosts in winter.

The region of the Coast Range is a very important portion of California, for there are found the great dairies, the finest stock-farms, and the best orchards and vineyards. This range is from 20 to 40 miles wide, and 500 miles long, with an elevation ranging from 2,000 to 4,000 feet, the summits and northern slopes only being covered with forests. In many places the foot-hills on the western slope of this range terminate at the seashore, and in other places upon delightful little valleys of great fertility and beauty. The famous red-wood forests of California are located in the Coast Range, as also are the celebrated quick-silver or cinnabar mines.

Passing to the southern third-part of California, one finds the eastern half of it in the valleys of the Mohave and Colorado rivers, an arid waste of sandhills and plains, relieved from absolute barrenness in places by patches of mezquites, with now and then a cluster of yucca or palm trees. The San Bernardino range has an elevation ranging from 3,000 to 6,000 feet, and a width varying from 10 to 20 miles, and is about 100 miles long. The summits and northern slopes are well wooded in parts of the range, but the southern slopes are generally quite barren, the foot-hills being covered with shrubs or grass. In the great valleys or plains lying between the mountains and the ocean are found the orange-groves and vineyards of southern California, and the chief towns of this district. Here, too, are the noted apiaries of the state, and on these plains, and in the adjacent foot-hills, are the best sheep-walks in California. Gold is found in the San Bernardino range, and in the San Diego mountains. A valuable tin mine has been opened in the Temescal mountains in the southern part of San Bernardino county. The climate of the southern coast-counties is the best in the state; the northern coast-counties being much cooler and more humid.

The lecturer then exhibited a large number of stereopticon views of the country, and particularly of southern California, which had been taken for his own use by an artist who was thus engaged eleven weeks in this part of the state. These views illustrated the grazing, farming, and fruit-growing industries in San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, and San Diego counties. Views of the chief towns and villages were also exhibited, and a brief description of each was given.

## SYNOPSIS OF A PAPER UPON "A SUMMER'S EXPLORATION IN THE SIERRA NEVADA."

BY A. R. CONKLING.

Our outfitting point was Carson City, Nevada. During the fortnight spent here in preparation, a series of meteorological observations were taken night and day. There is little else besides the Carson mint in the State capital to interest the stranger. We started out for Glenbrook, on Lake Tahoe, on September 15. But Lieutenant Wheeler was not the first comer to this region. In 1843, Fremont explored here, and left a cannon on the grounds, now owned by Captain Bray. In 1852, McComb surveyed an emigrant road at the foot of the lake. Later still, in 1862, Lieutenant Beckwirth reconnoitered portions of the Sierra Nevada, and in 1874 a coast-survey party did some work. But the first systematic survey of Lake Tahoe and vicinity was begun last year by our party. Flags were put up on prominent points on the lake-shore to be used in the triangulation. Leaving Glenbrook, the party traveled south to Lake Valley, California. At Kearney's, on the boundary of the "Gold" and "Silver" states, it was found that the dividing line ran through the middle of the dining room in the hotel; hence, whoever dines there, may eat in California and Nevada at the same time, by sitting at the middle of the table. The lofty mountains known as Job's Peaks were ascended from Rowland's. The view from the summit is very extensive. The Inyo mountains are seen in the far south, while on the north and west the Sierra Nevada range is visible for more than fifty miles. The lumber trade of this part of California deserves a passing notice. On account of the nearness of the Comstock mines, where vast quantities of timber are constantly required, the dealers find them a good market for their lumber. One operator named Gardner has a contract for sixty millions of logs for the mines. He has four years to fill it, and has built a railroad extending three miles back from Lake Tahoe, in order to haul his logs to the water. After the logs are brought to the water they are enclosed in a triangular boom, and towed across the lake to Glenbrook, where three saw-mills are kept running night and day. About 60,000 feet of lumber are sawed daily at this place. The lumber having been cut into the required form, is then transported to Carson City, either by wagons or in a flume, whence it is taken to Virginia City.

Leaving Lake Valley, our party crossed the western summit, taking the Placerville road. The scenery along this route is unsurpassed. In the American Fork cañon the walls rise over 700 feet, and are almost bare of vegetation. Before the completion of the Pacific railroad this road was the direct highway to the silver mines of Nevada. The travel was so large that \$20,000 was received at the toll-houses in a single season. Now this thoroughfare is seldom used save by the Californian fruit venders. It was over this same route that Mr. Greeley took his well-known ride of 109 miles in ten hours with the celebrated driver Hank Monk. Going northward, the highest points in the range were climbed, the principal of which are Pyramid Peak, Tallac Peak, and Twin Peaks. The view from Tallac Peak is one of the finest in America, rivaling even the scene from the summits of the Faulhorn and Righi in Switzerland; at least twenty lakes are visible, their mirror-like surfaces glistening in the sunlit sky, and forming a pleasant contrast to the somber hues of the densely wooded ridges. On a clear day Monte Diablo can be seen from Pyramid Peak, 150

miles distant. The rest of the season was spent in surveying the borders of Lake Tahoe. This lake is remarkable for its great depth, 1,645 feet being the deepest sounding taken. Lago Maggiore and Lago di Como are the only lakes in Europe deeper than Tahoe. These lakes are respectively 2,800 and 1,980 feet deep, but their elevation is much lower than Tahoe, which lies at the great height of 6,220 feet, or about the same as the top of Mount Washington. A zone of emerald-green water extends along the shore of this lake. The deep water has an exquisite ultramarine-blue color, and the transparency of it is wonderful. A white object can be seen at the depth of 115 feet. During storms, waves rise two, three, and even four, feet high. There is always a gently undulating motion of the water. During a fresh gale the waves beat against the shore with almost as much noise and force as on the Atlantic coast. The lake is well stocked with fish. Trout may be caught by trolling. Since the completion of the railroad, only thirteen miles of staging are required to reach Lake Tahoe. Hotels have been built on all sides of the lake, and it must sometime become a great pleasure-resort.



THE PLAN OF THE KING OF BELGIUM FOR THE CIVILIZATION OF  
CENTRAL AFRICA, AND THE SUPPRESSION OF THE SLAVE-TRADE.

MEETING OF THE SOCIETY, MAY 22, 1877.

## ADDRESS OF CHIEF-JUSTICE DALY.

The Society has been convened to consider the movement inaugurated by His Majesty the King of the Belgians, to promote the exploration and civilization of the interior of Central Africa, and for the suppression of the internal slave-traffic. As all the official communications from Brussels have hitherto been made to me as President of the Society, it is proper that I should give an exposition of the objects of the movement, with a narration of what has been done; and before doing so it may not be inappropriate, as introductory to it, that I should say something upon the subject of Africa.

Although Africa was the seat of one of the earliest civilizations with which we are acquainted—that of Egypt—it is of all the continents the one in which the least progress has been made, and which, up to the present day, has been the least known. The reason, to a great extent, is a geographical one. The civilization of Egypt was due to the extraordinary fertility of a valley made productive by the overflowing of the Nile, while the region at the south, from which the Nile came, was a desert, interposing a formidable barrier to any progress, at that time, in that direction. Civilization moved along the Mediterranean in the north of Africa, but was in the same way cut off from extending south by a vast and inhospitable desert, and when, in the course of discovery, Cape Bodajor was passed, and the whole outline of the continent became known, there still remained geographical obstacles to any extensive colonization or civilization of this great continent. Though Africa has the longest coast-line of any, it is, of all the continents, the one that is most deficient in bays and harbors. Nearly the whole of the eastern and western coasts, for about a hundred miles inward, are malari-ous, and it has not, like the other continents, great rivers that serve as high-ways from the ocean into the interior. It has rivers distinguished by their great length and for the volume of their waters, but they are either obstructed by rapids and cataracts, or navigation is impeded by the formation of back-waters and lagoons, or by the growth of tropical vegetation. It has, as we know, one of the greatest water-systems in the world, but one hitherto not available for opening up the continent itself.

In marked contrast with this was the continent of America, discovered but five years before Vasco de Gama had found a passage around Africa to India by the way of the Cape of Good Hope. The American continent had advantages which Africa had not. It had a long coast-line, abounding in capacious harbors, and many great rivers, navigable far into the interior. Both the coast and the interior were well adapted for settlement, from the productive character of the soil, the numerous harbors and rivers, and the salubrity of the climate. Thither, therefore, the tide of European emigration flowed, and America was rapidly peopled, whilst Africa remained comparatively stationary. The Portuguese established settlements on the western and eastern coasts, but they

produced no permanent effect upon the continent itself. Portuguese missionaries, for two centuries, made great efforts to christianize the natives, and erected churches, cathedrals, monasteries and colleges, but with no lasting results. Portuguese explorers penetrated into the interior, but neither commerce nor civilization followed in their footsteps. It could not well be otherwise. In the oft-repeated language of Bishop Berkley, "Westward the star of empire takes its way," and the mighty movement which settled and civilized America was not to be turned southward to the malarious coast of Africa and its unknown interior, while America offered the advantages which it did.

The Portuguese settlements on the coast flourished for a time, but flourished by means of the slave-trade, a commerce carried on to the general detriment of Africa, and to the advantage only of the maritime settlements by which it was conducted, and to the rival continent of America, where African labor was in demand. That very able and well-informed man, the American missionary Wilson, while extolling the Portuguese for the energy and courage they displayed in bringing to the knowledge of the civilized world countries which were not known to exist, very justly says that it is impossible not to execrate the meanness which could induce them to sacrifice the inhabitants of these countries to the cupidity of the rest of the world, instead of fostering and protecting them. The French and English established settlements upon the northern part of the western coast, which were maintained with difficulty, from the insalubrity of the climate. The Dutch established themselves, under more favorable climatic conditions, in the south, and built up a civilization which, under English rule, has extended from the Cape of Good Hope far up into southern Africa.

To reiterate what I have said: In three centuries from the discovery of America it was extensively settled and civilized, while the continent of Africa had only a few scattered settlements along its coast, maintained chiefly by the slave-trade. The great interior was unknown. As far as conjecture undertook to supply the place of knowledge, it was by the absurd representations pictured upon maps before the time of D'Anville, the French geographer; and when, after the revolution which he effected, cartographers rejected everything that was merely imaginary, the great interior of Africa was represented by a blank upon the map.

This was the state of things when the African Association was formed in London, in 1788, for the purpose of attaining a knowledge of the part of Africa then unknown, and by means comparatively new. The preceding attempts to penetrate the interior, though made by the most powerful nations of Europe, had been attended with little success. The African Association, as I have said, determined upon a new method, which was to send out individual explorers, whose expenses should be paid out of a fund raised by the Association; to do, in fact, what is now done by some of the leading geographical societies, for the exploration of the unknown parts of the earth. It was not a very inviting field. It was to go alone into a land known to be malarious; of pestilential swamps and vast deserts; a land supposed to be teeming with beasts of prey, and inhabited by savages deemed to be as dangerous; and the first one who stepped forward to accept such a mission was an American, John Ledyard, a native of Connecticut [applause], who died, however, of fever, in Cairo, before he could penetrate into the interior. He was followed by Mr. Lucas, who, after penetrating for a short distance, was compelled to return to Tripoli, and was followed by the third agent of the Association, Major Houghton, who, on his way to Timbuctoo, perished in the desert, after being plundered of all he possessed. This unpropitious beginning did not deter the Association, who, in 1795, sent out the celebrated Mungo Park, with whom began the successful carrying out of the objects the Society had in view. The African Association has long ceased

to exist, but the work which it commenced, of the exploration of the interior by individuals, has been followed up by devoted and heroic men, from Mungo Park to Livingstone, Cameron, and Stanley, to whom we owe, at the sacrifice of the lives of most of them, the knowledge of the interior that we now possess. When, over that past eighty-nine years, we review the list of noble and disinterested men who, in the interest of Africa and of the world, have labored in this field; when we consider the motives by which they were actuated, the perseverance with which they struggled, the courage they displayed, the privations and sufferings they endured, and the end of most of them, which was to find a grave in the land for whose regeneration they gave their best efforts and their lives, we may be able to appreciate the extent to which the world is indebted to them, and fittingly apply to them the lines of the poet Campbell upon La Pérouse:

Yet what is all that fires a hero's scorn  
Of death? The hope to live in hearts unborn.  
Life, to the brave, is not its fleeting breath,  
But worth—foretasting fame, that follows death.

The pantheon for heroes and hero-worship is, in our age, still open, when its niches can be filled by Park, Livingstone, and like martyrs in the cause of geographical inquiry.

Through the labors chiefly of the men I have referred to, we now know that, although there is a malarious belt along the eastern and western coasts of Africa, it does not extend very far inward; and that the great interior south of the northern desert is a healthy, well-watered, and most productive country; that in its fertility, undeveloped wealth, and salubrity, it compares with any other part of the earth of equal extent; that if the healthy, intellectual, and vigorous native races that people it were undisturbed, they would have advanced as savage races in other parts of the world have advanced, and would have made great progress, if aided by civilized man. This was the opinion of Livingstone, and has been the opinion of every intelligent explorer who has known much of the natives of the interior. It may be otherwise in the immediate vicinity of the coast, for the natives of the interior degenerate when they settle in that swampy and malarious region.

I say that, if the natives who occupy the vast interior had been undisturbed, they would have advanced in the scale of civilization. But they have not been. They are, as has generally been the case with savage races in fertile countries where life is easily sustained, broken up into many tribes more or less prone to make war upon each other. Their history, so far as known, is that of the conflict of one tribe with another, either in a state of open war, or holding such a relation to each other as prevents much intercourse or friendly intercommunication. The chief of one tribe exacts contributions from all who would pass the small limits of his territory; and if one people, by the cultivation of the ground or otherwise, advances in material prosperity, it is but a temptation to some rapacious chief and his followers to fall upon them and carry off the fruit of their industry. This is the natural condition of man in the savage state, wherever found, and it is that which, in the early periods of the world's history, made the progress of civilization so difficult. But the races of the interior of Africa have not only been subject to what is incident to all savages, but they have been exposed to destructive influences from without which have prevented their advancing in civilization had it been otherwise possible.

For more than two centuries most of the settlements upon the coasts have been the marts of the slave-trader, and raids into the interior the means by which his cargoes were obtained. The blighting, blasting and desolating effects

of these raids, which, commencing in the vicinity of the coasts, have been gradually carried far into the interior by Arabs from the eastern coast, and by armed negroes from the western coast employed by the traders, have never been fully realized until Barth, and recent travelers like Cameron, have described what has been done in our times, and is still doing, to the destruction of whole districts in the interior, by this traffic. Barth's description of the prosperous villages, filled with a happy and industrious people, through which he passed in his first journey, and who were so kind to him; and the picture of desolation and ruin they presented upon his return, after they had been visited by the slave-traders, is only what has occurred extensively, and is still occurring, throughout the interior, from the accounts of Cameron and other travelers—and this in a region for which nature has done everything, and which might be made one of the most productive portions of the earth. So far as the influence of civilized man, therefore, has been felt in Central Africa, with the exception of the little that has been or could be done by the missionaries, it has been a deleterious influence. It has been truly said that civilized man must ever stand convicted of having inflicted upon the unfortunate people of Africa the greatest calamity in his power. This injury the civilized world, within the past few years, has seriously set about repairing; and among the movements directed to that end, is the one inaugurated by his Majesty the King of the Belgians, which has brought us together to-night.

The explorations of individual travelers, especially within the past few years, has so enlarged our knowledge of the interior of Africa—we have learned so much from the journeys of Livingstone, Speke, Burton, Grant, Baker, Du Chaillu, Schweinfurth, Stanley, Nachtigal, Cameron and others—that we are now enabled to see more comprehensively what should be done to bring the whole of this great continent into its proper relation to the civilized world, so as to develop and civilize it, not only for its benefit, but for the advantages which civilized, and especially commercial, nations will derive from the development of its mighty resources. We are now enabled to see where the difficulties mainly lie; to see, in the light of our more enlarged knowledge, wherein the efforts in the past were misdirected, and why they were productive of little fruit; to frame systematic plans with an intelligence and with a result impossible before.

We have now, at least, a tolerable idea of the great water-system of Africa. If the Lualaba of Livingstone shall prove, as geographers now generally think, to be connected with the Congo, we will have a clear general idea of what nature has done for this continent, in the formation of great lakes and rivers, and of their connection with, or relation to, each other, together with considerable information of the nature of the regions through which these rivers flow; in other words, a large and comprehensive amount of geographical knowledge of the vast interior of Africa, and especially of the great central part of it, of which a few years ago we were totally ignorant.

It is very clear now that there are two things which are most essential—*first*, greater facilities for exploring the interior, which at present, on the part of individuals, is expensive, dilatory and dangerous; and, *second*, the suppression of the internal slave-trade; and if the first is attained, it will prove the most effectual means of accomplishing the latter. Little progress can be made towards the civilization of a country where, in the language of the poet, "burdened Nature asks the aid of man," unless that aid comes in the form of devising the means, and carrying them out, of traversing the country and bringing it in connection with the outward world; and this is especially so in Africa, which cannot be penetrated in its different parts, as other continents can, by great water-highways. It is the last of the great continents of the world to be opened up to the march of civilization, and its civilization is to be brought about in a way in many respects

different from the way in which Europe and America was civilized. Its great water-system, though not available now, will be most important in its future development; but, at the present, other means must be devised for traversing the different parts of it with security and facility, and it is this work which our age is called upon to inaugurate, as initiatory of the great results of the future.

His Majesty, the King of the Belgians, with a comprehensiveness that shows his intelligence, and with an interest in this ill-treated region of the earth that is creditable to his humanity, has applied himself to the consideration of this great problem of our times, with a view of working out some plan by which, with the co-operation of the civilized nations of the world, the exploration and civilization of the interior of Africa may be effected, in connection with the suppression over the whole of that continent of the slave-trade.

With this view, he invited specially a number of gentlemen who were either African travelers, heads of geographical societies, or geographers, to meet him in a conference at his palace, in Brussels, on the 12th of September, 1876, to consider the feasibility of organizing an international commission to promote the exploration of the unknown and imperfectly known portions of Africa, with a view to the extension of civilization over it, and the suppression of the slave-trade; and how the objects of such a commission, if established, could be most judiciously carried out. Thirty-six gentlemen attended, in pursuance of the invitation extended to them, from Germany, Austria, Hungary, Belgium, France, Great Britain, Italy and Russia, including such distinguished travelers as Baron Richthofen, Grant, Nachtigal, Schweinfurth, Rhöls, Cameron, Lux, Duveyrier, and the Marquis de Compeigne; and among geographers, Sir Henry Rawlinson, Sir Rutherford Alcock, Sir Bartle Frere, Vice-Admiral Baron de la Roncier le Noury, Admiral Heath, Count Zichy, Commander Negri, Hochstetter, Maunoir, de Semenoff, Count Goblet d'Alviella, Da Lovelye and others. His Majesty was pleased to invite Mr. Latrobe and myself to attend the Conference from the United States; but, greatly to our regret, neither of us was able, from our professional engagements, to be present, and the United States was not represented.

The Conference was organized on the 12th of September, 1876, by electing His Majesty as President, and continued in session at the palace for three days. The coming together of a body of gentlemen so thoroughly informed upon the subject in respect to which their advice and co-operation were asked, was marked by the very practical character of the whole discussion of it, and by the unanimity with which the final conclusions were arrived at, which were that an International Commission should be established, to be composed of the presidents of the geographical societies then represented, or who might thereafter be added, and of two delegates from the different countries taking part, to be appointed annually by a national committee to be organized in each country. That a permanent Executive Committee, to carry out the object and to manage the funds, should be established at Brussels (as the most central point), to be composed of the President and three or four members, to be named annually by the International Commission, whenever convened. That the object aimed at should first be carried out by the establishing of a permanent station on the eastern coast of Africa, from which a chain of stations might gradually be extended into the interior, forming a connected and permanent means of communication; which station, while affording every facility for commercial enterprise or missionary effort, should not be directly connected with either, but act under the direction of the International Commission in such labors as might result in obtaining a thorough knowledge of the countries where the stations were placed, and for this purpose giving material aid to, and exerting whatever influence they could to facilitate the labors of, all who might engage in the task of exploration,



whether connected with the Commission or not; to do in their immediate vicinity whatever might be in their power for the well-being of the natives; inciting them to industry by instructing them in the mechanical arts and in agriculture; promoting peace and harmony between different tribes; securing them in their homes and occupations from being carried off by the slave-raiders, and doing everything that could be done judiciously and practically to counteract and suppress this infamous traffic; in a few words, establishing communication with the interior by means of these stations, and making them in their immediate vicinity centres of influence and protection for travelers and explorers, and for the gradual improvement of the material and moral condition of the native races in whose midst they were placed. This, in brief, is what is contemplated by a line of stations from the eastern coast; and if they should, as there is every reason to believe, be successfully established, the further object contemplated is to project from the western coast a like line of stations until they meet those advanced from the eastern coast, so as to effect eventually a connected line of communication across the greatest breadth of the continent, each carrying out individually, and in connection with each other, the objects I have stated.

The International Commission was afterwards duly organized with the King as its President, and the Executive Committee established in Brussels, which has been engaged during the year in perfecting the international organization and in raising the necessary funds, a very substantial sum having been contributed in Belgium. Contributions have also been sent from other nations, and several other countries not represented at the Conference have since co-operated in the movement. A national committee has been organized in this country, of which Mr. Latrobe is the president, and two gentlemen will be appointed from this committee as delegates to the next meeting of the International Commission, or, as it is now called, the African International Association.

I have already expressed my hearty approval of the whole plan, both in reply to communications addressed to me by His Majesty and in my last annual address. In my judgment, it is the most practical, comprehensive, and intelligent measure that has ever been proposed in respect to Africa; and if it is carried into full operation, there is no doubt in my mind as to the results it will accomplish both for Africa and the world. But there are several gentlemen here to-night—some from their long residence in Africa, and others by the attention which they have given for years to the problem of extending civilization over that continent—who are much better able to form an opinion in respect to this measure than I am, and from whom, I hope, we shall have the pleasure of hearing in the course of the evening. The Council, deeming this movement one of great importance in a geographical point of view, have called the Society together to have an expression of its sentiments, so that, if favorable, the movement may have all the influence which the approval of the Society can give it.

The Rev. J. B. PINNEY, Ex-Governor of Liberia, then addressed the Society at some length in respect to western Africa, the progress that had been made there, and the beneficial effect of British rule in that part of Africa, but as he said very little upon the subject for the consideration of which the meeting had been called, his remarks were not taken down.

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Chief-Justice DALY said: It affords me great pleasure to introduce the Rev. Alexander Crummell, a gentleman of the African race, who is a native of this State, and a graduate of Oxford, England, who has lived many years in Liberia, engaged in the discharge of the duties of a clergyman, and is now the pastor of



a congregation at our national capital, Washington. His views in respect to the project of His Majesty the King of the Belgians will, I am sure, be listened to with great interest, as he brings to the consideration of it a great deal of experience in Africa, combining a knowledge of the country, its resources, and an intimate acquaintance with the native African character.

#### REV. ALEXANDER CRUMMELL'S REMARKS.

Mr. President: It is a most singular fact that now, in the nineteenth century, in an age of great practicality, we should be witnessing two remarkable movements, distinguished in a very marked degree by sentiment. We see, on the one hand, a mighty movement of a great Christian nation to extinguish the sufferings of the subject Christians of Turkey, to strike the crescent from the minarets of Constantinople, and to rescue St. Sophia from the hands of the Moslem. And, on the other hand, we stand at the commencement of a grand endeavor of Christendom to wipe the blood from the bruised brow of Africa, to lift up its vast populations to enlightenment, and to rescue a great continent from the dominion of superstition and barbarism.

Well, sir, it would seem as though the age of chivalry had returned to a busy, plodding, commercial, manufacturing era; and that it is likely to give dignity to our age, and grandeur to its motives and its endeavors. I have called this movement for the benefit of Africa one distinguished by sentiment, but not by mere sentiment, for I regard the objects of this meeting to-night as thoroughly practical, deeply human, and entirely worthy of the age. It is—it should be—thoroughly human, undertaken with no one-sided views and purposes; but carried on in a manner which shall affect *all* the interests of man, temporal as well as eternal—a movement which shall regard the objects of our compassion, and likewise the interests of all the participants in this noble scheme, in all the divers phases of our common humanity.

Now, in this project, the COMMERCIAL IDEA is, to a greater or less degree, a matter of interest and solicitude. And this seems to me perfectly legitimate. I cannot regard it as in any way discordant with the *sentiment* which I believe is its main characteristic. Africa is a land of most magnificent resources. It abounds everywhere in its tropical regions with woods and dyes, gums, minerals and oils. Every adventure of a new traveler results in the discovery of new staples, of vast beds of ore, of wide expanses of the richest and most fertile soil. And there are yet remaining immense and mysterious regions where noble herds of elephants roam undisturbed, whence, ere long, great cargoes of ivory will be brought to civilized lands.

SCIENCE is, without doubt, another special interest which is pressing her claims in connection with this philanthropic movement. Doubtless she is anxious, over-anxious, to penetrate the hidden mysteries, both human and material, which for centuries have baffled the skill and scrutiny of the learned, from the time of Herodotus to the recent ventures of Livingstone, Stanley and Cameron. And her claims must be admitted, not only as real, but as perfectly harmonious with the highest moral purposes of this grand scheme. The MUSE OF HISTORY, with rapt gaze and ready pen, sits awaiting the disclosures which tradition, in many a heathen tribe, may furnish concerning the annals of the oldest but least known of all the continents. And then, with equal eagerness, but with sturdy frame and fiery blood, there stands the SPIRIT OF ADVENTURE ready for the start, anxious to enter every hidden nook, to penetrate every mysterious corner, to clear up every doubtful question, and to make every possible discovery the ingenious mind can reach to.

These, sir, are some of the collateral motives which are, more or less related to this movement, both in Europe and America, and which doubtless will claim a place beside the highest philanthropy or the most zealous religionism. And all of these ideas and aspirations are without doubt elements in the strong convictions which have prompted His Majesty the King of the Belgians and his eminent coadjutors to this last grand endeavor for Africa's deliverance. But the mainspring of their action is, I am convinced, the Christian and humanitarian sentiment, which craves the restoration of a continent, but which is aware that all true and noble sentiment demands the regulative direction and control of reasonable and thoughtful practicality. And I have the deep conviction that this "International" movement has its foundation in reasonable and thoughtful practicality.

During the last hundred years there have been various efforts put forth by civilized Christian men for the regeneration of Africa. Some have been successful, some unsuccessful. Let me pause here for a few moments, and dwell upon some of these efforts.

There have been not a few attempts of religious bodies, in the carrying out of which there has been the expenditure of vast amounts of treasure and a great sacrifice of life, but which after all, have proved fruitless in results. I might spend hours here to-night in narrating the missions which have been established on the coast of Africa from the fifteenth century to the present, not a trace of which can now be discovered. In these endeavors there has been no lack of zeal. The courage which has been displayed has been equal to that of martyrs. The talent—the mental genius—which has been connected with not a few of these attempts has been remarkable; and yet again and again they have been failures. The pestilential nature of the climate will not account for the entire misadventure.

Why, then, it is asked, so much failure? There is this notable reason to be given: men, large bodies of men, have been sent to Africa to save the souls of men utterly regardless of their temporal needs and requirements.

But there have been as well successful missionary enterprises in Africa, and in every case that I know of success has sprung from the remembrance that the native African is a creature compact of mind, body and soul; and that you cannot benefit him spiritually by a forgetfulness of his temporal and bodily interests. That has been the secret of their success. I have but to refer you to the British possessions on the western coast of Africa as an evidence of this truth. You will doubtless remember that when the English government in the last century commenced its warfare against the slave-trade, the policy pursued was to capture the slave-trading vessels on the western coast and carry them to Sierra Leone. The recaptured Africans were immediately placed under the care and instruction of Christian missionaries in Freetown and the other settlements; but the English, with that strong practicality which is their national characteristic, endeavored simultaneously with the spiritual improvement they gave these men, women and children, to impart to them a knowledge of handicraft. Carpenters, blacksmiths, boat-makers, and men of other trades were brought from England to instruct these poor creatures. Industrial schools were organized; model farms were established; in some cases native African youths were sent to England; and now, at the present day, there is hardly a craft or business in a civilized community which cannot be found skillfully carried on in their West African colonies from the Gambia to Lagos.

This has been the material basis of success in the missions of the Church of England and the Wesleyan Church in western Africa. The native pagan has been taught that he must work, and not only support himself, but help to support the missionary. The English Church missionaries, all along the coast and in

the interior, began their missions by *practical* operations in all the spheres of action. Their endeavor is not simply to get a soul into heaven; it is to make him a man "in all the correspondence of nature." The result is that their converts are never allowed to become mere pensioners upon societies.

Civilizing processes accompany all the efforts which are made for evangelization, and mission work along the entire coast and far up the Niger has been a grand success, as well for the material outward life of the native population as for their inward spiritual regeneration. There have been grand opportunities, too, which have been lost. I have a very great dislike to render blame against England in connection with her African policy; I dislike to make the least reflection upon her; but I do think she is blameworthy, especially with regard to two recent provinces which have been placed within her reach.

Having lived on the western coast of Africa, I have witnessed her grand and beneficent rule; I have seen the spread of her civilization; the uprising, through her zeal and beneficence, of fine communities to civility and refinement. I think she should have crowned the whole by one grand stroke of policy, philanthropy and governmental rule, under the signally favorable circumstances opened before her within the last decade. But she has lost the grandest opportunity she recently had of settling the difficulties of interior Africa, and the work is now left to this African International Association.

You all remember that in 1868 Great Britain went, by her armies, into Abyssinia, at eleven degrees north latitude, and conquered that sanguinary kingdom. That was the time when she might have planted there, permanently, at one and the same time, the red cross of Britain and the standard of civilization and Christianity. Believing that nations have moral duties, it seems to me that that was the duty of a Christian nation like England—to save that people from barbarism, and to add another nation to the ranks of civilization. But, singularly enough, only a brief period afterward—that is, in the year 1874—Great Britain was forced by the clearest duty to enter, by her armies, on the opposite side of the continent, the kingdom of Ashantee. By a reference to the map you will see that Ashantee is on well-nigh the same parallel of latitude. Was not the coincidence and providence remarkable? And Great Britain, with her wondrous resources, could have established herself permanently in Ashantee as the centre of missions and trade, and thence, advancing her posts and authority, with rule, peace, order and justice to interior tribes and nations, put an end to the internal distractions of the continent, gone directly across toward Abyssinia, and met the approaching lines coming from the Indian coast. If England had done this great work, she would have found everywhere, in almost every tribe, a grand instrumentality, indigenous to native character, furthering her beneficent efforts. Any people, any agency, whether governmental or missionary, which brings simple, peaceful facilities for trade to the native African, will always be received with gladness.

When I had the honor, a few days ago, to address the American branch of the Association at your rooms, I remarked that the acquisitive principle is to be the main temporal agency in redeeming the native African from barbarism. He is essentially a trader; he has large wants; he is not a stolid, passive, dead creature, as many suppose, albeit he is uncivilized. He has large, undefined wants, a great craving for commodities, things which he has seen, and a curiosity and a desire, springing from imagination, for things which he has not seen. And this, I take it, is the germ of a marked greatness in the future native African.

And here I beg to remark that whether you are a missionary or merely a civilized man, the first thing in entering Africa is to remember that there are two factors to be regarded in carrying on your work. One is to know what *you*, the civilized man, can contribute to the work; the other, what is the contribution the native man can make. If the native man cannot give anything, depend upon it he is a dead man! If there is no point of receptivity in his nature, nothing can save him! But greed, the acquisitive principle, is the grand characteristic of the native African. Here, then, is the point of vantage in work in Africa. The continent is a bee-hive. Every village is a market, and almost every hut in a village is a shop. Every head man, or chief, or king, is a merchant; and all his people, down to the very slaves, are hucksters or petty traders. Greed, inordinate, universal greed, pervades every community, small or large. A friend from West Africa, only a few weeks ago, sent me a paper which shows that from Freetown, Sierra Leone, no less than three steamers\* sailed to England within nine days, carrying goods amounting to more than two-thirds of a million of dollars (\$700,105). What were these commodities? Palm-oil, palm-kernels, kernels, camwood, ebony, ivory, ground-nuts, gum, barwood, beeswax, india-rubber, copal, bennie-seed, cotton, Shea butter, etc., etc.

How were these commodities gathered? In the most difficult manner conceivable. In huts and remote villages, and brought, at great peril, on the backs of native men, twenty, thirty, forty days' journey through dense

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\* Exports of commerce to England in nine days in three steamers:

The British mail-steamer *Roquette* cleared from Sierra Leone custom-house October 2, 1876, with the following: 1,600 casks palm-oil; 83½ tons palm-kernels; 3,403 bags palm-kernels; 266 bags bennie-seed; 60 bags copra-nuts; 9 bags ivory; 5,139 billets camwood; 2,039 billets ebony.

The British mail-steamer *Ethiopia* cleared from Sierra Leone, October 11, 1876, with the following cargo: 698 casks palm-oil; 122 casks Shea butter; 104 casks and barrels rubber; 18 barrels and 5 bags gum; 469 bags coffee; 1,343 bags palm-kernels; 1 case skins; 13 parcels, 30 bags ground-nuts; 212 bags bennie-seed; 499 pieces ivory; 11 bales ivory; 1 box ivory; 4,080 pieces barwood; 923 pieces ebony; 150 bales cotton; 26 packages merchandise; 11 boxes and parcels with specie and gold-dust.

The British mail-steamer *Loando* cleared from Sierra Leone with the following cargo: 1,103 casks palm-oil; 4,069 bags palm-kernels; 98 bags copra-nuts; 14 bags Guinea-grains; 14 bags ginger; 6 bags bennie-seed; 960 bales cotton; 1,586 pieces camwood; 53 of ivory; 40 tons palm-kernels.

| TOTAL.              |                  |
|---------------------|------------------|
| Palm-oil .....      | \$567,175        |
| Palm-kernels .....  | 29,272           |
| Bennie-seed .....   | 1,760            |
| Ivory .....         | 43,525           |
| Camwood .....       | 2,550            |
| Ebony .....         | 400              |
| Copra-nuts .....    | 1,000            |
| Guinea-grains ..... | 224              |
| Ginger .....        | 108              |
| Cotton .....        | 13,840           |
| Shea butter .....   | 24,400           |
| Rubber .....        | 1,954            |
| Gum .....           | 276              |
| Coffee .....        | 13,122           |
| Barwood .....       | 500              |
| Total .....         | <u>\$700,105</u> |

wildernesses, or by hundreds of little canoes, through streams and rivers, to traders' ports.\*

Bishop Crowther, in 1872, was wrecked on the Niger, and after his arrival at Sierra Leone he published a narrative of his journey overland, from Rabba to Abbeakuta, and thence to Lagos. One remarkable fact arrested my attention: it was that, in moving from town to town, in this purely pagan district, 400 miles from the coast, he found many native African traders from Sierra Leone, Christian men, pushing their trade in safety among the rude inland people, but meeting together on Sundays for Bible reading, prayer and praise.

Why, then, you ask, if the love of trade is such a strong passion in the breast of native Africans, why does not trade and commerce work out their own remedial processes? From the simple fact that trade everywhere meets with the interruptions of selfish men, who blindly, through excessive greed, overreach themselves. Greed in the native African is too absorbing, one-sided, unintelligent a principle. For, first, the native kings are ignorant, heathen men, thoroughly selfish, and ready to fight their neighbors in order to prevent them from sharing the advantages of trade. They have never learned that the greater the freedom of trade the greater the advantages to themselves and their neighbors. Acting on the opposite principle, they keep up perpetual fights, tribe with tribe, nation with nation; so that, for long periods, trade is brought entirely to an end, and large populations are made sufferers. And next there is the grand disturbing element, the malign and destructive influence of the Moslems. *They* are the chief marauders in almost every part of Africa—north, east, south and west.

Everywhere they are the great slave-traders. Through the largest tracts of territory, across vast provinces in the interior, their tracks are marked by blood and devastation. I know it is claimed that the Mohammedans are great civilizers in Africa; that their religion serves to supersede the fetichism and the idolatry of pagan tribes, by carrying with it the doctrine of the Divine Unity, and propagating the Koran. And many people are foolish enough to believe this. But the unanimous testimony of travelers and missionaries is that they care more for the sword and the mastery it gives them than for any purposes of civilization. All the good they do is but incidental. While they may furnish a small modicum of enlightenment, they flood the continent everywhere with oceans of disaster, ruin, and bloodshed. What, then, is needed for the restoration of Africa, for the introduction of peaceful trade, elevating missions, progressive civilization?

Africa needs some grand master influences to correct all these evils. She needs a power brought from some quarter which shall give easy access to trade

\* Exportations from West Africa in the year 1874:

|                    |                     |
|--------------------|---------------------|
| Palm-oil .....     | \$375,000           |
| Palm-kernels ..... | 71,000              |
| Camwood .....      | 90,000              |
| Ebony .....        | 90,000              |
| Ivory .....        | 32,000              |
| Ground-nuts .....  | 1,500,000           |
| Ginger .....       | 24,000              |
| Rubber .....       | 55,500              |
| Gold .....         | 96,000              |
| Total .....        | <u>\$11,212,000</u> |

There are twenty British mail-steamers that ply between Liverpool, Glasgow, and the western coast of Africa. The exportation last year (1876) exceeded \$20,000,000.



and barter in the interior, and prevent the constant disturbances of petty chiefs. She needs an authoritative force that shall hold in check the disturbing influence of blind, insensate greed, and at the same time, furnish the native with ordinary facilities for gratifying his strongest desires. Africa needs, in a word, a grand *police force* all over the continent, restraining violence, keeping open grand avenues of commerce, affording protection to missionaries and travelers, protecting weak tribes and nations from powerful marauding chiefs.

The proposal of the King of the Belgians, I regard as eminently practical, both with respect to the physical and the moral needs of the continent. It brings the moral support of the greatest nations of the earth to this grand moral effort. The expeditions which shall be sent from both the eastern and the western coasts of Africa will doubtless carry the flags of their respective nationalities. Already the native chiefs in the interior have learned to respect and know the significance of these banners of great peoples. Those of you who have read the travels of Werne, and Barth, and Krapf, of Richardson and Vogel, know how, away up the Nile, at Khartoom and Kardofan and cities still more remote, the British consuls by their national flag have not only commanded respect, but have given protection to many a European traveler. Just this commanding influence, more powerful perhaps than the armed men who will push these posts and expeditions through the country, will be felt through many a tribe and nation over vast districts, sustaining missions, accelerating the movements of traders, travelers, and civilizers, and furthering all the purposes and plans of improvement.

For these reasons, sir, I rejoice in this movement. I have the largest expectations of good and beneficence from its operations. I have the most thorough conviction of its need, its wisdom, and its practicality. At the same time I am not sanguine enough to suppose that all its grand results will be immediate, or that it can arrive at all its gracious ends void of disaster. In a large scheme like this obstacles are sure to arise. Difficulties, complications—nay, even death may be expected. Just such melancholy issues are always to be looked for in every vast and comprehensive scheme of benevolence.

But I feel that this is the grand, final, effective effort, which will usher in the regeneration of that continent. And if it do but succeed, then the dawn of her civilization shall be seen at an early period in all her quarters. Schools for little children shall be filled, their eager, joyous minds craving the enlightenment which comes from letters. Agriculture shall change the wild surface of vast regions of the most fertile lands, with a most marvellous ease, and turn them into Edens of productiveness and wealth. Trades and handicraft shall be introduced among millions of unemployed people, thus replacing comfort and personal property for degradation and barbarism. Commerce shall bear the crude, untold wealth of the tropics to foreign lands, and bring back in return the costly fabrics, the improving machines, and the civilizing commodities which impel a people along the lines of superiority and elevation. Art shall multiply its blandishments,

“To soften the rude and calm the boisterous.”

And far above them all, Religion shall exert its regenerating influence in millions of souls, changing everywhere the face of society; building up families, reconstructing nations, diffusing the blessings of peace, giving universal freedom to millions of slaves, elevating women, and erecting the spires of churches on every hill-top and through all the valleys of that benighted continent.

It was a remark of the great William Pitt: “We may live to behold the nations of Africa engaged in the calm occupations of industry, and in the pur-



suit of a just and legitimate commerce; we may behold the beams of science and philosophy breaking in upon their land, which, at some happier period, in still later times, may blaze with full lustre, and joining their influence to that of pure religion, may illuminate and invigorate the most distant extremities of that immense continent." This brilliant vision never met the eyes of the great British statesman, nor of any of his contemporaries. It has been postponed to an era far distant from his day and time. But, sir, only let this grand movement be fully carried out, and I believe that there are people of this present generation who shall witness this noble imagination realized along the whole line of the coast of Africa and throughout all its broad central regions.

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#### REMARKS OF JOHN H. B. LATROBE.

##### FELLOWS OF THE AMERICAN GEOGRAPHICAL SOCIETY:

I had no intention of being more than a listener when accepting the invitation to attend the present meeting; but when called upon to address you, the deep interest which I have for many years felt in Africa and things African, and now, and most especially, my high appreciation of the noble plan for the exploration of the Continent which the King of the Belgians has originated, will not permit me to remain silent.

As President of the American Colonization Society, I have known personally all my predecessors in the office, and following in the footsteps of these distinguished men, it is not likely that I would be indifferent to any measures that promised to advance what they had so much at heart—the civilization and evangelizing of Africa. They believed this could best be done by the gradual transportation of the descendants of her children, of their own accord, to her shores, bearing with them the learning and religion of a Christian people.

The course of events has not falsified their expectations. The interest in Africa, confined for years upon years to a very few, has spread in all directions throughout the world, and would now seem to have become concentrated in the present effort of one of the most enlightened sovereigns in Europe to make, by a judicious exploration, the continent of Africa as well known in its length and breadth, its products, its peoples, and its resources, as any other of the continents of the world. Thus the plans that have been adopted for the proposed exploration commend themselves to the best judgment of all who are interested in the subject. The support that the King of the Belgians has received from the other nations of Europe is most satisfactory; and there is no reason why America should not be found among the contributors of the funds upon which the success of all exploration must necessarily depend. That the colored people of America are to play an important part in carrying out the proposed exploration, if not to-day, yet in a not remote future, cannot be doubted. In Liberia they have already shown their ability to establish and maintain an honorable nationality; and it is not to be doubted that the day will come when, not confined to Liberia, they will be found active and useful wherever civilization and religion shall find a foothold on the shores or in the interior of the continent.

Of the ability of the race to meet all the exigencies of the great scheme now set on foot by the King of the Belgians, whenever called upon to aid, no better proof can be offered than that which has been presented this evening in the person of Professor Crummel, of unmixed African descent, an American by birth, long and honorably known as a resident in Liberia, and whose remarks,

listened to with so much pleasure by all his hearers, have shown how thoroughly he understands and fully he appreciates the present scheme of exploration. As the concentration of what may be called sporadic efforts in this direction hitherto, this plan is most important; and the thoughtful care that has been given to it in all its practical details affords the best promise of success.

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#### REMARKS OF WILLIAM TRACY.

MR. PRESIDENT: The fact that a European monarch has invited his brother sovereigns, and the learned men and philanthropists of Europe, to assist him in an endeavor to bring the whole millions of Africa within the range of civilization, has awakened a deep sense of gratitude in many a benevolent heart in our land. The enterprise is one worthy of the distinguished prince who conceived the idea and gave his warm efforts to render it a success. The uplifting of Africa from the degradation which has characterized her sons from the earliest historic periods, and raising them to the condition of intelligent Christian freemen, is an enterprise over which angels will rejoice. For age after age slavery has devastated Africa. Until the last century hardly a human heart was warmed to bestow freedom, civilization and Christianity upon her millions. It is true that a few—a very few—Christian missionaries had visited its coasts, but these self-denying efforts had been few and feeble. No striking success had been achieved. Africa was still the abode of savages. Almost no attempt had been made to explore her interior, and at the commencement of the present century little more had been learned of her geography than was known two thousand years ago. The map of its interior had not been changed since the days of Herodotus. The source of the Nile was a mystery. The course and mouth of the Niger had not been revealed. Nothing was known of the Congo, and the whole interior of the vast continent was a blank, laid down on the map as undiscovered countries. How all this has been changed within the recollection of many of us here present!

Geographical discoveries by a small but noble band of explorers, most of whose names decorate the martyrology of science and of philanthropy, have added fact to fact, and solved the problems which had puzzled the geographers through the centuries. The survey of the course of the Niger, and the disclosure of its connection with the ocean, has brought its shores within the realm of commerce, and a native Christian bishop, once a slave-boy, now sets forth the doctrines of his Master to its inhabitants, and counts under his episcopal charge numbers of presbyters, his own converts from idolatry, who are preaching civilization and the Gospel to thousands upon thousands of their countrymen. The present year, the discoveries of Stanley, supplementing the labors of his distinguished predecessor Livingstone, solved the problem of the sources of the Nile and of the Congo river. These explorations have opened the way for the noble enterprise, to assist in which we have met this evening.

Its friends hoped for the active co-operation of English philanthropists with those of continental Europe in promoting it. You, sir, well remember how for many years English philanthropy was busy in arousing the consciences of our northern men to the evils of slavery, and showing them that it was their duty to abolish it from the United States. It was not enough that you and your philanthropic friends sought to remove slavery, and open the continent of Africa to civilization and Christianity by kind and gentle measures in the way that seemed best and meet. You sought to rear in Africa an asylum for negroes

from America, and a radiant point from which should beam civilization and Christianity to her remotest shores.

With these memories, we hoped that English philanthropists would have cordially united with the Congress at Brussels in promoting the great enterprise. We supposed they would gladly unite their efforts with those of any people whose object was the civilization of Africa. It is with regret, therefore, that we are unable to write them down among the promoters of the International Society. We may hope, however, that their determination to act alone will ultimately yield to the logic of events, which in a few years may enroll in a single common effort all the benevolence of Europe and America to regenerate Africa. Let us hope that in their own way they may accomplish much. There is room for every effort that can be expended while any of the present generation are inhabitants of earth; and though it now seems that in a union of all there would be strength, we can cordially uplift the prayer—God prosper them all, and bring the day when Ethiopia shall stretch forth its hands to the living God, emancipated, civilized and Christian.

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#### REMARKS OF PAUL B. DU CHAILLU.

It affords me great pleasure, Mr. President, to comply with your request to give an expression of my views upon the feasibility of the plan proposed by His Majesty the King of the Belgians for the exploration of the interior of Africa, and the extension of civilization over the continent. The plan adopted has many advantages, and the placing of stations at intermediate distances is quite practicable. To a certain extent it has been adopted by the Khedive of Egypt, and the journey from the Nile to the lakes discovered by Speke, Grant, Baker and Long, is now made comparatively with ease. The water communication of the continent is well adapted for this project, and the inland trading routes used by caravans would facilitate it.

But we must not be too sanguine. Though the plan can easily be carried out in many parts of Africa, in others great difficulties will have to be surmounted on account of the physical nature of the country, of its population, and of the religion of the people.

It was a noble sentiment that led the King of the Belgians to propose his plan, and reflects great credit upon his good heart, for the object he has in view will not only promote the civilization of Africa, but lead towards the extinction of the slave-trade.

This plan, wherever successful, will also help to enlarge our scientific knowledge of that part of the world of which we know so little; for the travelers and explorers who have been the pioneers of this great work have had neither time nor the leisure to study the different branches of science, and most of them had not the knowledge required for such a pursuit. The scientific and careful observer will make the stations his headquarters.

In the interior the region is healthier, and the natives appear more intelligent and more tractable, except in those regions where the slave-trade has been or is carried on, the effect of which is to bring out the worst qualities of the natives. I consider the suppression of the internal slave-trade in Africa the greatest blessing that could befall the country; but it is an enterprise fraught with great difficulties. In time the African may be persuaded that it is more to his interest to keep the natives where they are than to allow them to be captured, or to sell them to the slave-trader; but to convince him of that, he must be satisfied by

experience that trading in other products is better and more profitable. This will be promoted by the chain of stations contemplated in the plan of the King of the Belgians better than anything else that I can think of; it therefore meets my hearty approval.

Mr. Pinney has spoken in very glowing terms of Liberia. When I visited the place I was not favorably impressed by it, although it had been settled many years. The streets were laid out, but the grass was growing in the main street as high as my body, with only a narrow foot-path through it. The difficulty of establishing towns on the West Coast is very great; indeed it is difficult for the African to make much progress in those coast settlements. To accomplish much he must be associated with white men.

My own experience confirms what has been said by Mr. Crummel. I found the African a great trader; he loves barter for the sake of it, and he will go into distant countries where dangers are to be encountered for commerce, and will curb a great deal of his wild nature if he can only be persuaded that it is for his interest to remain peaceful. Hence one sees a trading settlement of a single merchant standing alone on the lonely coast, where the trader feels safe, for the natives have learned that in those places it is for their interest to be honest; and if accidents or murders take place, the fault can be laid generally to the trader himself.

Of course, the success of the proposed undertaking and the usefulness of these stations will depend very much on the tact of the men who will have charge of them, and also on those who may choose them as their headquarters for their scientific researches. Any rash act on their part may jeopardize not only their own safety and that of the settlement, but also the welfare of those who may follow them, and may be the cause of irreparable mischief. Let us all wish success to the plan proposed by the King of the Belgians.

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#### REPORT OF THE HON. HENRY SHELTON SANFORD,

*U. S. Delegate from the American Branch to the Annual Meeting of the African International Association, in Brussels, in June, 1877.*

BRUSSELS, July 30, 1877.

To the Hon. JOHN H. B. LATROBE,

*President of the American Branch of the International Association for the Civilization of Central Africa:*

SIR: Having accepted the appointment of delegate to the International Convention at Brussels, I left New York on the 2d of June, and although delayed by an accident to the steamer, I arrived here on the 19th, the eve of its meeting.

It was convoked, as you are aware, by its President, the King of the Belgians, to carry into practice the principles laid down by the Brussels Congress of last September, funds sufficient (and almost entirely subscribed in Belgium) having been raised to warrant an immediate commencement of execution in Africa of the great work of civilization and humanity inaugurated by His Majesty. Delegates from Austria, Belgium, France, Germany, Holland, Hungary, Italy, Spain and Switzerland, were present, besides the undersigned, sole delegate from the United States; my colleague, Mr. Schieffelin, owing to ill health, having been, to his regret, unable to appear. I refer to the minutes of the

sittings hereto annexed for their names. The Portuguese and Russian delegates were not present, having been prevented by circumstances independent of their will, as stated in their letters to the Secretary General. England alone, of the nations who took part in last year's Congress, appointed no delegates and was unrepresented, its Royal Geographical Society having found, I believe, some constitutional difficulties in the way of uniting with foreign associations, and preferring, for reasons of its own, to act for itself, while, however, expressing sympathy with the objects of the International Association.

The delegates non-resident in Brussels were lodged at the King's palace, and all were treated with princely hospitality; there also were held the sittings of the Convention, presided over by His Majesty.

I refer to the minutes annexed for details of the proceedings which followed, on the programme laid out by the Executive Committee and presented by the Secretary General, Baron Greindel, confining myself to its action upon the most prominent questions before it. These were as to the character of the Stations or Posts to be established, their location, and lastly, the direction and field of operations for exploration.

Without any instructions as to the views of the American Committee, and without sufficient knowledge myself, I had counted upon the presence of my colleague to speak with the authority of experience upon these questions, and I did not besides feel authorized, the more especially as America had furnished none of the resources in aid, to make myself prominent in the discussions for their application. When the question of the character of the Posts or Stations came up, there was found to be considerable divergence of opinion upon the plan presented by the Executive Committee, and it was referred back to it and to other members as a sub-committee for a new report. In this I took part, and was glad to find that the views as expressed to me in a private letter of the learned President of the American Geographical Society of New York, Chief-Justice Daly, harmonized very generally with those of the committee, and after a full and free discussion the plan reported to the Association was accepted, with some slight modifications. (See minutes.)

It was decided that the Posts should be both hospitable and scientific, and should, after a certain time, be made to support themselves, and always to be in a position to aid travelers in need of their assistance; that they should be under the charge of a *chef* or superintendent, assisted by a limited number of non-African associates. The scientific mission of the station should consist so far as possible in astronomical and meteorological observations, collecting specimens of geology, botany and zoology, mapping the surrounding country, preparing a vocabulary and grammar of the languages of the natives, making ethnological observations, collecting and reporting the accounts of indigenous travelers in unknown regions, and in keeping a journal of all events and observations worthy of note. The hospitable mission of the Post to be to receive all travelers whom the *chef* may deem worthy; to provide them at cost (at the station) with necessary instruments, goods and provisions; to furnish them with guides and interpreters; to give information as to best routes, etc.; to transmit their correspondence, and to endeavor to establish through the various depots regular communication with the coast.

The abolition of the slave-trade was included as one of the ulterior objects to be arrived at by the civilizing influences of these establishments. Placed in the front rank in last year's Congress, it was concluded expedient to put it in less aggressive or rather less prominent place here; that this revolution of the practice of ages could be best obtained by the enlightening influence of commerce, and contact with those who, by inspiring confidence and friendship, would end by securing respect and influence, and thus in turn, with patience,



perseverance, time and persuasion, gain over home missionaries, so to say, for this great cause.

It was decided that the first Post should be located on or beyond the Lake Tanganyika (and this to be the base for operations), with the view of establishing others successively at more advanced points, but power was given the Executive Committee to modify these indications, in the event of unforeseen difficulties; and also that the expedition make Zanzibar its point of departure for its destination. These questions gave rise to considerable discussion (see minutes). The Dutch delegates preferred the western coast, where their people had already large commercial establishments, indicating especially the exploration of the Congo, etc., and they had already offered, in the name of the African Commercial Association of Holland, facilities of transport by their ships and storage of baggage, etc., at their numerous stations there. The Spanish delegates preferred going by Zambesa to Lake Nyassa. The Italians inclined to the locality where they already have a station, under charge of the Marquis Antinori, at Choa, but only asked for the moral support and protection of the International Association, which was unanimously given. The Austrian delegates proposed the plan of Herr Marno, to follow up the Nile to the limit of Schweinfurth's explorations in the Mombouto's country, and there establish a station.

I submitted the plan of Mr. Southworth, not as emanating from our Geographical Society, as incorrectly reported in the minutes, but as from a former secretary of that Society, and for such observations as it might call forth. These plans, whether by reason of the insalubrity of the western coast for the Dutch, by interfering with those of the English-African Exploration Committee as for Lake Nyassa, or the distance to arrive at the objective point of the expedition which militated against the others, were not found acceptable to the Convention, which finally decided unanimously on the location and route as before mentioned. The Convention decided upon the route by Zanzibar, on the recommendation of the Executive Committee, for the following reasons:

1st. The advantage of depot, and the friendly aid of a large French commercial establishment (Roux, Freissinet & Co.), the centre of whose extended operations on that coast is at Zanzibar, with whose assistance, and under the protection of the Sultan, who has manifested specially friendly feelings for the Association, its base of supplies can be safely established, and without cost.

2d. The superior facilities for reaching the locality determined upon for the establishment of the first Post, and point of departure for the explorations of the Association.

Three missionary stations (two Protestant and one Catholic) are established on the mainland opposite, and their friendly assistance and co-operation is assured. On the route to Lake Tanganyika, about two-thirds the distance at Unyanesi, is the establishment of a Swiss named Bloyon, who is married to a daughter of the King of that country, who goes yearly to Zanzibar, and who also offers his services in aid of the work of the Association. At Ujiji, on the lake, the English have establishments; thus three stations already form a line of communication towards that to be established by the Association, and along a route already known.

These questions being determined, the Executive Committee was authorized to select the chiefs of the expedition, as well as the associates both of explorers and at the Posts; to establish new Posts before the next meeting of the Association if found expedient; and to aid national explorations, especially those recommended by a vote of the Convention, when increase of resources will permit.

Deferring to the earnest and unanimous desire of the Convention, the King consented to serve another year as President, assuring it of his zeal and co-op-



ration in the trust conferred upon him, but expressing the opinion that, in the interest of the Association, the presidency should not remain too long in the same hands.

The Executive Committee, as you are aware, consists, besides the President and Secretary General, of three members, representing the Germanic, Latin, and English-speaking races—Dr. Nachtigal, of Berlin; M. Quatrefages (of the Institute), of Paris; and Sir Bartle Frere, of London. The latter having been appointed Governor of the Cape Colonies, sent in his resignation, and the appointment of his successor was on the order of the day. Your delegate received the unanimous vote of the Convention, and, while regretting that some more competent and experienced American was not here to bear the honor intended for our country, did not feel that he should decline it. His Majesty ratified the vote of the Convention by some complimentary remarks, referring to former official relations for many years as Minister here.

The flag adopted by the Convention for the Association, after the King had positively declined the use of the Belgian flag or emblems, is a gold star upon a blue ground.

The proceedings of the Convention closed on the 21st ultimo, with the thanks of His Majesty to the members for their co-operation, and by it of the expression of its gratitude to His Majesty for the hospitality so lavishly extended to it.

I would add here that the point for the establishment of the first Post, which is to be the headquarters of the expedition and the point of departure for exploration, will be at or beyond Nyangave, the extreme point reached by travelers thus far, beyond Lake Tanganyika; and the direction of exploration thence will be westerly towards the Atlantic, which opens up a vast region of unknown country, and if the Congo is traced from the sources to its mouth, a result will be attained of an importance the magnitude of which it is unnecessary to dwell upon to you.

The direction of the expedition has been confided to Captain Crespel, a very competent, accomplished, and trustworthy officer on the General's staff of the Belgian army; his two associates at the Post are also selected, and, like him, are Belgians, and one an army officer, it having been thought advisable that each Post should consist in its non-African element of men of the same nationality, and as limited in number as possible, consistent with the work to be done. Herr Marno, of Vienna, a well-known traveler, who has made three voyages of exploration in Africa, has been appointed explorer. All go without remuneration save the payment of their outfit and expenses. They expect to sail in one of the steamships of the Union Mail Steamship Company, from Southampton, on the 18th of October, for Zanzibar, around the Cape via Natal, that company having generously offered free transportation to the expedition, its outfit, etc., besides other valuable assistance through its officials and local agents. The Donald Currie line, it is just to say, was equally liberal in its offers to Natal, but its ships go no farther.

It will thus be seen that the expedition will be at a minimum of expense, and another economy is hoped to be reached by profiting by the experience of the English missionary establishment at Ujiji, which, instead of carriers, has employed oxen and carts procured from Natal, the results of which will be known and can be availed of by the time the expedition arrives at that Post. As to the means of the association to provide for this first expedition, in furtherance of the great international work inaugurated by the King of the Belgians, they have been exclusively raised in Belgium, with the exception of 5,000 francs (\$1,000) contributed by Austria. I refer to the minutes for the report submitted to the Convention of the receipts which the Belgian Committee turned over to the Association.

|  |                 |
|--|-----------------|
| The amount of general subscriptions, in round numbers, is..... | \$60,000        |
| Of annual subscriptions paid, or to be paid.....               | 20,500          |
| First installment by the Austrian Committee.....               | 1,000           |
| Total in hand .....  | <u>\$81,500</u> |

By the statutes of the Belgian Committee, the money it raises is to be invested for the benefit of the Association. The sum, therefore, that was deemed applicable, looking to the interest on the present fund and the annuities likely to be received, was fixed for this year at \$14,500, and, on this basis of subscription, at \$15,000 for 1878, and \$15,500 for 1879, without taking into account what will be furnished by other committees.

With regard to the system adopted by the different national committees to raise funds for the International Association, I give such as I have been able to procure.

#### BELGIUM.

One of the objects of the Belgian Committee, as stated in its statutes, is to organize a national subscription, and to centralize all resources placed at its disposal to carry out the purposes of the International Association. All funds—reserving only what is necessary for the expenses of the committee—are to be turned over to its treasurer, who will invest the same, and hold the interest at the disposal of the Executive Committee. Local committees remit their collections monthly to the National Committee, whose members contribute to the work by annual subscription, or in some other way having relation to the common object. The exploration of Central Africa has been popularized in the country by disseminating pamphlets in French and Flemish calculated to interest the masses, and also by the publication of a careful *résumé* by M. Banning, of the work of African discovery.

#### SWITZERLAND.

The Swiss National Committee proposes to organize a national subscription, and turn over the total result to the International Association.

#### HOLLAND.

The funds raised by the Dutch National Committee are administered by its treasurer and secretary, and what are not necessary for the expenses of the committee will be sent yearly to the International Association.

#### FRANCE.

It was intended by the French National Committee to organize a lottery in favor of the International Association, but it has been lately decided to await first the result of the subscriptions now opened. Subscriptions are solicited for any amount from one franc upward. The annual fee for membership of the committee is \$3; those paying \$100 are exempt from fees, and are enrolled as founders. One-half of the money raised remains in the hands of the French Committee to enable it to aid National African exploration; the other half goes to the International Association. In the event of dissolution, all the funds of the National Committee will revert to the Geographical Society of Paris for an African exploration fund. Subscription lists are opened at various points in France and her colonies, and the cause is actively promoted by the president of the Committee, Monsieur de Lesseps.

#### SPAIN.

The Spanish National Committee is composed of members who pay \$10 annual fees, or \$100 for life membership. One-half the sum raised, as a general rule, is to be remitted to the International Association.

## GERMANY.

Life membership in the National Committee is \$75 (300 marks), annual dues of others 5 marks (\$1.25) minimum. The committee is to apply annually, as a general rule, to the International Association one-half its funds raised the preceding year, after paying its expenses and excepting those subscriptions designated for special objects.

## AUSTRIA.

Those who pay \$25 are enrolled as founders of the National Committee, and are dispensed from the payment of annual fees; other members pay yearly at least 50 cents, as before said. The Austrian Committee has already contributed \$1,000 to the International Association.

I have not, as yet, at hand the details as to the Hungarian, Italian and Portuguese National Committees.

The other National Committees, it is thus seen, are proposing to raise funds in aid of the work of the International Association, and I hope our own will not be backward, the more especially as, in so far as active co-operation is concerned, we are likely, I think, to stand alone of the English-speaking races—England having decided to act by herself, in order to sustain her supremacy in that field, and in furtherance of the interests of her commerce and her colonial dependencies. Such, at least, are the views put forth at the meeting convoked in London, under the presidency of the Lord Mayor, on the 19th instant, to promote African exploration. Although, to be sure, the leaders express sympathy with, and hopes for, the success of the International Association, and hold out the possibility ultimately of giving it aid, as before said, the hearty co-operation on her part, which will be given by other nations, can hardly be counted on. With no aims of conquest or aggrandizement, with no special interests to promote other than those of civilization and humanity, I hope that the whole united effort on our side the Atlantic will be to further the International plan of action, with the certainty that its results will redound to the common good of all.

There are, however, special reasons why we of the United States should promote actively and earnestly this great work of the International Association; nearly 5,000,000 of our people are of African race—descendants of slaves. Contact with the white races and, lately, emancipation, education and equality of political rights, have made them by far the superiors of the parent race, and will tend to excite a spirit of enterprise, ambitions and desires hitherto dormant, and for which Central Africa opens a wide and peculiarly appropriate field. Physically they are better adapted than the whites to resist its climate, and to undergo fatigue. But I will not enlarge on this topic; it is one well worthy the attention of our philanthropists and our citizens generally. The idea of this people, by the aid of the descendants of those who held them as slaves, returning to civilize and regenerate the parent country—to extirpate the slave-trade, and introduce into that fertile region the cultures which they were sold from their homes to toil at across the ocean—is certainly attractive, and one worthy of earnest promotion in the United States; and I venture to hope that our committee will take early steps to excite interest in the work and object of the International Association throughout our country. It can count upon my earnest and best efforts to render all the assistance in my power to promote so philanthropic an undertaking.

I have the honor to be,

Your obedient servant,

H. S. SANFORD.

## MODERN RESEARCHES IN PALESTINE.

BY THE REV. SELAH MERRILL, D. D.\*

It is hardly an exaggeration to say that at present there are no unexplored lands. Thanks chiefly to the spirit and enterprise of the nineteenth century, all continents and islands, all seas and lakes have been visited and traversed; so that we have their position and names indicated upon our best maps, while our best libraries contain volumes which furnish pretty full details with regard to their climate, resources, history, and inhabitants. The explorations and researches that have been carried on during the past forty years have established the seeming paradox that new worlds are to be sought for only in the old worlds; not, however, *upon*, but *beneath* the surface of the earth. The great Niebuhr passed over Nineveh without perceiving it, and the old broken rampart of brick or earth he mistook for a ridge of hills. (Gibbon Hist. iv, 499, *note*.) Nineveh, Troy, Mycenae, Ephesus, Rome, and Jerusalem have been visited by scores or hundreds of travelers, whose pens or pencils may have been trustworthy; but those who have gone to these places to *dig*, are those who have revealed most thoroughly to us the real life of antiquity. In regard to explorations, the present is emphatically the era of the pick-axe and the spade. And while Egypt, Italy, Cyprus, Greece, Asia Minor and the Euphrates valley are rich in sites that have yielded to the careful excavator results of the most wonderful and interesting character, it is to be remembered that Palestine has also its buried cities and its ancient sites, which date from the fifteenth and even from the twentieth century before the birth of Christ, and which still wait for the tools of the excavator to reveal their treasures and relics. It is hoped and expected that when the work of the Society is actually resumed again in the field, its archaeologist will be instructed to spend a little time and money in looking *beneath the surface*, particularly at certain interesting points.

I wish to call your attention to the interesting fact that it has taken not merely generations, but centuries, to raise up a class of men who would study Palestine in a religious, and at the same time in a thoroughly scientific spirit. Indeed, it is only in recent times that such a spirit has become prominent. The fact that the Bible has a physical basis may be called a modern idea. Men have somehow been very slow to understand that a divine revelation implies history, and that *history* implies *locality*. If the history and revelation are to be fully appreciated, the locality must be known. One cannot but be surprised at the great variety of motives that have led men in the past to visit or study Palestine. Some went to Judea to gratify their passion for adventure, others to seek their fortunes, and a very few only to gather knowledge. Pompey entered the Temple at Jerusalem, but the historian mentions with surprise and admiration that he did not appropriate its treasures. A little later, however, Crassus (B. C. 54) took from the Temple upwards of ten thousand talents in gold and silver, and one huge ingot of gold besides.

\*Dr. Merrill has been connected with the Palestine Exploration Society, as its archaeologist, for three years past, two years of which he has spent in the field, and his labors in the department of Biblical research have been mentioned with the highest praise by Drs. Thomson and Van Dyck, of Beirut, Prof. Kiepert and Dr. Delitzsch, Prof. Sayce, of Oxford, and other English and American scholars.

The Romans in general had exaggerated ideas of the wealth of Judea. It was to them a sort of gold mine—just the place where politicians could repair their broken fortunes, or where generals could gather quickly the means for carrying on their expensive campaigns. The Romans had abundant opportunity for collecting the fullest and most reliable information with regard to Palestine and its people; but they seem to have regarded both with comparative indifference, if not in all cases with contempt; and to their meagre notices of the Jews and Judea we are indebted but for a minimum of accurate and useful knowledge.

Soon after the beginning of our era commenced the age of pilgrimages, and of the worship of relics. This age embraced a period of several centuries, if, indeed, it can be said even yet to have entirely passed away. A journey to the Holy Land as an evidence of one's religious zeal became as fashionable and as necessary as a journey to Mecca is to a devout Moslem to-day. A few voices—faint amid the din of the hosts that were marching eastward—were raised against the necessity of these tedious pilgrimages, and good men tried to show the multitudes that Heaven was as accessible from Britain, Gaul, or Italy, as it was from Palestine itself.

Judea also was the great emporium of relics. The exportation was large, but the supply was not thereby exhausted, or even diminished. Devotion was nurtured by them, and the wealth of those who trafficked in these sacred things was increased. Climate and natural resources, mineral deposits, archæological and topographical details were considered of little account in comparison with the pleasure and the merit of possessing precious mementos of saints and martyrs.

During the present century Palestine has been visited by numberless travelers, and the volumes that have been written about the country may be reckoned by hundreds. Very few of these volumes can be regarded, however, as adding to the general knowledge of the Holy Land, while perhaps not more than a score of these writers were actuated by what we regard as the proper spirit in which investigations and researches there should be carried on.

Overlooking the fact which I have already mentioned, that even the Bible has a physical basis, many persons have had an ideal Palestine about which they have written books. But Palestine, as it exists in their minds, has little likeness or relation to the actual Palestine which lies on the east and on the west of the Jordan. And an obstacle which the explorer sometimes meets with is the reluctance on the part of such people to have anything done which may interfere with their ideal Holy Land. While we cannot stop to characterize individual writers on Palestine and explorers in that country, we may refer to two as representative men, namely: Ritter, as representing the careful and scientific students who have never visited Syria, and Dr. Robinson, as representing the few travelers and explorers who carry on their researches in a reverential, but at the same time in a critical and truly scientific spirit.

The scientific explorer will be characterized, for one thing, by the use he makes of *tradition*. Some devout persons never question the pious traditions of Palestine; and the unscientific explorer is liable to value them far beyond their real merit. Tradition is never to be accepted without question; nor, on the other hand, is it to be discarded as wholly misleading and false. For example, if a person follows tradition as a sure guide, he must locate the cities of the plain at the south end of the Dead Sea, and do so in defiance of all the evidence which geology, physical possibilities, and archæology have to present, which is opposed to tradition to such a degree as to be overwhelming.

The scientific exploration of the Holy Land has, in spite of many obstacles, made a good beginning. The pick-axes and spades of Capt. Warren's men at Jerusalem have brought to light many important facts with regard to that ancient city, and on the plain of Gennesaret cuttings made under my own



observation in a mound not far from 'Ain et Tin convince me that a good part of Capernaum is buried at that point. Under the auspices of the English Fund, the measurement of western Palestine is nearly complete, and the work is said to be more accurate than even the ordnance survey of England.

The American Society, to which was assigned eastern Palestine, has been in the field far less time than the English, but a large portion of the country has been triangulated, and the latitude of many important points in the remaining portion has been fixed, which, together with the angles, and the many topographical details that have been collected, will enable the Society to construct a map of that region which will be thoroughly accurate and reliable. The sheets of this map are now being prepared by the skillful hand of Mr. Rudolph Meyer, one of the Society's most capable engineers. Prof. Kiepert, of Berlin, who has seen a portion of this work, speaks with great enthusiasm of its value and importance.

The archaeological results of both the English and American parties have been great, comprising, as they already do, a vast amount of materials which will serve an important purpose in illustrating the history of the country, and the geography and antiquities of the Bible.

With regard to the country east of the Jordan, which was my special field of labor, I will say that I have a list of upwards of one hundred Biblical places, including rivers, of which about seventy have been identified with absolute certainty, or beyond any reasonable doubt. Some of the remote parts of Moab, where a number of the unidentified places must be looked for, have not yet been thoroughly explored, and there is reason to hope that a majority of the sites that remain unknown will yet be discovered. But what has already been accomplished ought to be regarded as a triumph for the efforts of explorers in that region. A good many of these sites, or between thirty and forty, I think, have been brought to light by the officers of the American Exploration Society. All this, it must be remembered, is exclusive of the map-work just referred to—of the one hundred splendid photographs that have been taken, some of them from places never before visited by a photographer; of the multitude of inscriptions that have been collected, and of the numerous cities that have been identified in connection with the ecclesiastical history of that East-Jordan land. It seems to me that those who have contributed to this object through the American Society, at whose head stands that indefatigable and zealous worker in its behalf, the Rev. Roswell D. Hitchcock, D. D., must feel that they have not spent their money in vain.

I find that a misconception prevails in many minds with regard to the dangers and hardships of the general work of exploration in the east. What has been done hitherto has not been accomplished without a fearful loss of life, compared with the small number of men that have been employed. The danger arises not from the unfriendliness of the natives, but chiefly from the climate. The heat in the Jordan valley, as I can testify after having spent over two months there in making my explorations, is intense—the air at times almost stifling; while the malaria is sufficient to place the lives even of those who are least susceptible to its influence in constant jeopardy.

Lieut. Dale, who was really the scientific element in the expedition sent out under Lieut. Lynch to the Jordan and the Dead Sea, was taken with malarial fever and died, and is buried at B'hamdun, a village in the Lebanon mountains, between Beirut and Damascus. In 1835, the enthusiastic Costigan attempted to navigate the Jordan and the Dead Sea; But, after great suffering, he reached Jericho, whence he was carried to Jerusalem to die. In 1847, Lieut. Molyneux made a similar attempt to that of Costigan, and in like manner fell a victim to the climate—the third martyr to scientific exploration in this strange



and inhospitable valley. In 1835, Otto Friedrich von Richter, an explorer of considerable note, died in Smyrna from disease contracted while in Syria and Palestine. Roth, sent out to this region in 1857 by the King of Bavaria, to make scientific explorations, was taken with fever in the marshes near Lake Merom, the modern Huleh, which ended his valuable career.

The English exploration party have suffered in the loss of Charles Frederick Tyrwhitt Drake, a most thorough archæologist, who died in 1874, and of Corporal James Duncan, of the English Royal Engineers, who died in 1868. Both these men are buried in Jerusalem. Nor is it out of place to refer to Burckhardt and Seetzen, the pioneers of exploration in eastern Palestine, who, although they did not die in Syria, fell victims to the hardships and dangers to which explorers in the East are constantly exposed. In 1837, Beke was obliged to relinquish his attempt to explore the Dead Sea because he suffered so severely from the climate; and Captain Stewart, who followed Captain Warren in charge of the English survey, was obliged to return to England shattered in health. I ought not to omit all reference to George Smith, who fell a victim to the same climate and hardships to which explorers in Palestine are exposed, although the actual scene of his labors and death lay outside of the limits of the Holy Land. This man was my personal friend, and I was watching his career with the deepest interest; hence, perhaps, you can imagine my surprise and pain, when, on coming back to Beirut from a tedious campaign in the Jordan valley and the deserts beyond, I learned that this brave and talented explorer had died at Aleppo.

These references will show that researches and explorations in Palestine and the East have not been carried on without severe exposure to health and the sacrifice of valuable lives. Personally I have been very much favored in the matter of health, and during the two years that I spent in the country I lost, in all, not more than six or seven days by sickness. I was also particularly fortunate in all my connection with the Arabs. I treated them kindly, and received from them only kind treatment in return. They served me faithfully on all occasions, and my person and property were as safe among them as if I had been among my friends and brothers in America. It gives me pleasure to be able to offer this testimony with regard to the character of these wild sons of the desert.

It is proposed, during the present lecture, that we consider the Jordan valley, the possibility of its being irrigated, its hot sulphur springs, its remarkable *tells* or mounds, the question of the site of the "cities of the plain," and, if possible, some general facts illustrative of the fertility and populousness of the country east of the Jordan in ancient times.

Between Lake Tiberias and the Dead Sea there is at present but one bridge over the Jordan, and that is Jisr Mejamieh, about six miles south of the Sea of Galilee. Just below this lake are the ruins of a once fine Roman bridge of ten arches, which was, no doubt, on the main route from Tiberias and Tarichæa to Gadara and the eastern cities and plains. On the Menadhireh, or ancient Hieromax, or Yarmuk (for the stream is known by all these names), which is the first tributary of the Jordan on the east below the Lake of Tiberias, there is a bridge of five arches situated only a few miles from the point where the two rivers unite. The next and only other bridge of which there is at present any trace, is one now in ruins at the Damieh ford, which was on the high road from Nablus or ancient Shechem to Gilead and eastward. This bridge was originally Roman work, but there are evidences of extensive repairs by the Moslems or Crusaders. On the east side the bank is quite low, and the wide flat at that point is often overflowed; hence it was necessary to build a causeway across the low ground, which was done at great expense. I traced 450 feet of this cause-

way or eastern approach to the bridge, which was supported on arches nine of which remain. The original length of this causeway was probably 100 or more feet greater than that indicated by the figures which I have just given. The foundations of the abutments at the eastern end are still perfect. The bridge itself over the river must have been not far from 100 feet in length. Formerly there were ruined piers in the stream, and my Arab guides said they used to swim to them; but they have been washed down by floods and are no longer visible. The foundations on the western side have likewise disappeared.

Roman civilization demanded the convenience and luxury of substantial roads and bridges; and when some civilized power again gets control of Syria and the Holy Land, we may expect that these conveniences of travel and commerce will be restored. At the present time, at Damieh, and also at Jericho, there are ferry-boats, run by strong ropes which are stretched across the river. Once in the Bible, when David returned from Mahanaim, a ferry-boat is mentioned for carrying across the household and goods of the king. (2 Sam. xix., 19.)

The exploration which I conducted, was the first that has ever been made of the entire valley on the east side of the river, between the Lake of Tiberias and the Dead Sea. The general width of this half of the valley is from three to four miles, while in the Succoth region and on the Shittim plain it is from six to eight miles. The northern part of this valley, including all the portion between the Lake of Tiberias and the Jabbok, is not a desert as has been supposed; for no less than a dozen streams, besides two respectable rivers—the Jabbok and the Hieromax or Menadhireh—flow down upon it from the hills, and most of them are living—i. e., they flow all summer. The Hieromax is nearly as large as the Jordan itself where this leaves the lake. In February and March this portion of the valley resembles New England in the month of June. The soil is then burdened with its own productions. By the last of May the weeds, thistles and wild mustard have become so rank that they are as high as a man's shoulders on horseback, and it is almost impossible to drive a horse through them. This portion of the valley is, perhaps, 35 miles in length.

South of the Jabbok or Zerka, for about twenty miles, or as far down as Wady Nimrin, the soil is quite barren, except during the winter months, because there are no fountains or streams among the hills to send down water upon the plain. It may be necessary to state that the barrenness of the soil in this portion of the valley is only apparent, since it is naturally fertile, and, if it could be irrigated, would become as fruitful as a garden.

From Wady Nimrin to the Dead Sea, a distance of about 15 miles, lies the great Shittim plain, watered by three copious streams, which make it a beautiful oasis. The Bible, in speaking of the eastern half of the Jordan plain, divides it according to the natural oases, which doubtless existed then as they do at present, namely, Beth-haran, Beth-Nimrah, Succoth, and Zaphon. The Talmud, in its physical divisions of that portion of Perea, follows the same order as the Bible (Josh., xiii, 27). Beth-haran was the southern and middle portion of the Shittim plain; Beth-Nimrah was the northern portion; Succoth was the region just north of the Jabbok; while Zaphon, meaning the north, ran up to the Sea of Galilee. (The Talmud, however, appears to identify Zaphon with the oasis about Wady Rajib, where the city Amathus stood, which is now represented by Tel Ammata.)

I have made a careful examination of the Jordan valley on the eastern side of the river, throughout its whole extent, with special reference to its being irrigated from the Jordan itself, and I am convinced that the project is a very feasible one. Every square mile not now irrigated could be watered from the Jordan, and the expense for dams and canals would be small compared with the large

amount of valuable land that would thus be made productive. If we reckon the valley at 70 miles in length, and 3 miles in average width, we should have 110 square miles of land as fertile as any prairie, and which, at 25 bushels per acre, would produce between three and four millions of bushels of wheat. In this calculation it will be observed that I make no estimate for the valley on the side west of the river. Here is a vast valley, and the means for making it one of the most fertile and productive on the globe, lying side by side, waiting for the skill of man to bring them into conjunction.

It is an interesting fact that while in the valley itself there are almost no ruins, there are a good many in the foot-hills; and these are situated in every case on the water-courses which I have mentioned, in such a way that while they had a good head of water in the fountain or stream behind them, they had spread out before them the fertile plain with its marvellously winding river, beyond which the hills of western Palestine rose in grandeur. I have visited thirteen such ruins, and some of them I judge to have been places of wealth and importance.

If it should be objected that this valley, on account of the malaria and terrible heat, could not be inhabited, these ruins can be pointed to as evidence of its former condition of populousness and prosperity. Besides these ruins in the foot-hills, there are others on some of the tels or mounds in the Jordan valley, particularly those on the Shittim plain. It should also be mentioned, that certain tribes of Arabs live in the valley nearly or quite all the year round. People born there can live there well enough.

One of the interesting facts connected with the Jordan valley, is that of the hot sulphur springs, which exist at various points. Those at Tiberias are best known, perhaps, because they were very famous as a healthful resort in antiquity, and are still frequented by multitudes from all parts in search of health or pleasure. South of the Lake of Tiberias, and about one hour above the point where the Hieromax leaves the hills, are the hot springs of Gadara. Between this and the Jabbok, I succeeded in bringing to light two groups of hot springs not previously known—at least they are not mentioned by Ritter or Robinson, or even in the recent scientific work of Lartet. One of these is just north of the site of ancient Pella, on Wady Hammat Abu Dhableh, and the other is at the mouth of Wady Zerka. At Tel el Hammam, on the Shittim plain, there is another, and east of the Dead Sea, on the Zerka plain, is the famous group to which the Greeks gave the name of *Callirrhoe*. There is good reason for supposing that the springs at Tel el Hammam, on the Shittim plain, are those which Herod the Great visited during his last illness.

The springs at Tiberias and Callirrhoe are the hottest, while those at Callirrhoe and Gadara send forth the greatest volume of water. I was most interested in those at Gadara. There are four of them in one group, and a few miles up the valley is another, almost equal in size to the four just mentioned combined. The temperature of these springs is, respectively, 115°, 103°, 92°, 83°, and 112°. That one which has 103° temperature is the largest of the group of four, being 60 or more yards in length by 30 in width, and the average depth of the water is six feet. In it is a small floating island, covered with canes and reeds. I swam in this spring as many as fifty strokes in a straight line, and a more delightful bathing place I never saw. That one which has 115° temperature, I found was a little hotter than I could endure, although the Arabs who frequent the place prefer it.

As these springs are considered healthful, some suitable for one and others for other complaints, the ground about them is by common consent regarded as neutral, and friends and foes meet here in peace. If the water flowing from the three hottest of the four springs forming the group just referred to were united,

I estimate it would form a stream 20 feet in width, and 18 inches in depth, with a rapid current.

There are extensive ruins about these springs, including a beautiful theatre. After the destruction of Jerusalem, the Jews had a flourishing school at Gadara, and the rabbis used to visit these springs and walk for recreation along the bank of the river. If El Hamma, as this place is now called, could be rebuilt, it would become not only one of the most attractive resorts in Syria, but one of the most interesting in the whole world. At present it seems a pity that these delightful and healing waters should flow on forever, without being enjoyed by those who would both appreciate and be benefited by them.

In connection with the hot spring which I discovered near Pella, at Wady Hammat Abu Dhableh, I found also a fine natural bridge spanning the deep ravine just above the spring. It is from 20 to 30 feet wide, 80 to 100 feet high, about 200 feet long, and its single great arch is 25 or 30 feet in height at the highest point. The Wady runs from east to west, the banks are very steep, and the bridge forms a striking object when looked at from below.

I wish also to call attention to the tels or mounds which exist in the Jordan valley, because, as some of them are wholly or in part artificial, they carry us back to the Canaanite, or to the pre-Canaanite period, and may help us in solving the problem of the site of the "cities of the plain" that were destroyed. These mounds appear in groups. There are some interesting ones around Lake Merom, on the upper Jordan. Again, in the Succoth region, just north of the Jabbok, there is a second group. And, finally, on the Shittim plain there is a third cluster, which deserves our careful study.

Independent of any historical evidence on this point, I think my researches have established the fact that, with regard to the Jordan valley, the flat land was never occupied by cities and towns of importance, but that these were situated either in the foot-hills, or upon natural or artificial mounds in the plain. In connection with the lowlands, cities are several times mentioned in the Bible, as occupying tels; while in the valleys of the Tigris and the Euphrates, a city presupposed a mound on which it was built. There is a statement in Numbers xiii, 29, which shows that the Canaanites lay along the Jordan valley, and their occupation of it may have extended back into the remotest times. A decisive proof that these tels were the sites of cities or towns, is the fact that several of those in the Lake Merom and the Jabbok groups have ancient ruins upon them; and, further, all the mounds, without exception, on the Shittim plain, are covered with ruins, and at least three of these we are able to identify with places which existed in the time of Joshua. Hence it follows, that if we are to look for the site of ancient cities, no matter how ancient, in the Jordan valley, we must first of all examine the tels.

One of these tels in the Succoth group bears the name of Der'Alla; and Neubauer, in his "Geography of the Talmud," states that Succoth was called Ter'allah. These words are identical, with the exception of the two initial letters, *t* and *d*, which often interchange. My opinion is, that we have here a clue to the identification of the Succoth which is connected with the history of Jacob. From certain indications, I suspect that cuttings into this mound would reveal ancient remains which, even if they did not consist of numerous objects of gold and silver, such as have rewarded Dr. Schliemann's excavations, might, nevertheless, be extremely important in elucidating the history and antiquities of this valley. Somewhere in this immediate region were the brass-foundries of King Solomon, where the metal work for the temple was cast; and as the same physical conditions exist now that existed in Solomon's time, it is not improbable that future researches and excavations may enable us to point out the exact locality where that work was done.

It may be well to notice the fact that, at certain points along the valley there are slight elevations, which may be called *littoral mounds*. They are, however, not remarkable in any way, and have no importance to deserve our notice. This fact is referred to, because a certain critic of my work, who withholds his name, has stated that all the mounds in the valley were "mere littoral mounds." With all due respect, I must say that this critic writes without any adequate knowledge of the facts, and that the mounds of which I am speaking are beyond dispute wholly or in part artificial. My chief reasons for this opinion are, 1st. That in a few cases where they have been cut into, ruins, walls, pottery and bricks have been found. 2d. Columns, capitals and fine squared stones project from the ground, suggesting the existence of buildings there in ancient times. 3d. Supporting walls exist in a few cases, formed of several tiers of great boulders or blocks of unhewn stone, which are four or five feet thick, eight and ten, and even twelve feet long, and six feet wide; and in two or more cases, where the walls formed angles, there were foundations apparently for towers.

#### THE SHITTIM PLAIN.

But I wish to direct especial attention to the Shittim plain, which is about 15 miles in extreme length by seven or eight in width. With it I include now the oasis of Nimrin, which is at the north end of this plain. Here is situated Tel Nimrin, covered with ruins, which corresponds to the Bethennabris of Josephus (War., 4, 7, 4), and likewise to the Beth Nimrah of the time of Joshua.

For the sake of convenience, I will consider the portion south of the Nimrin oasis as the Shittim plain proper. It is watered by two fine streams, which pour down from the mountains in Wady Kefrein and Wady Hasban.

In some respects this plain, as thus defined, is one of the most interesting portions of the Holy Land. Among the memorable historical events connected with it may be noticed the sin of the Hebrews with the Midianites, and the terrible retribution visited upon those idolaters; also the completion of the law, and the farewell of Moses; the sending forth of the spies to Jericho, and the final preparations before crossing Jordan.

We find here five remarkable tels, namely: 1. Tel Kefrein, which corresponds to the Abila of Josephus, and to Abel Shittim of Joshua's time. 2. South of this is situated Tel er Rama, which corresponds to the Beth Ramtha of Josephus, and to the Beth Haram (or Haran) of Joshua. Herod Antipas rebuilt or fortified this place, as it belonged to Perea, which was a part of his territory, and, in honor of Julia, the wife of Augustus, gave it the new name of Julias, or Livias, for it bears in history both these names. There is sufficient ground, I think, for supposing that here was held the notorious feast when John the Baptist was beheaded. This point is one of the localities where I am particularly anxious to make excavations. 3. Following still south an irregular line from Tel Kefrein and Tel er Rama, we have a place called Suweimeh, which from its position near the Dead Sea, also from its distance from the other places as indicated in the Talmud, Eusebius or Josephus, and from the signification of the name, I think should be identified with the Bezimoth of Josephus, and with the Beth Jeshimoth of Joshua. When the Hebrews came down from the mountains of Moab, they pitched from Beth Jeshimoth on the south to Abel Shittim on the north, and their tents must have covered the whole plain. At the time of Josephus, Abila and Livias, and perhaps also Bezimoth, enjoyed the rank of cities. Between this irregular line already referred to as running north and south, and the Jordan, I crossed the plain in several directions, but found no ruins of any kind, nor any mounds of any importance. But between Tel Kefrein and Tel er Rama on the west, and the mountains on the east, there are two



important tels which remain to be noticed. These are Tel el Hammam in the north, where there are extensive ruins and a hot spring; and Tel Ektanu in the south, about two miles from the other, on which are some of the oldest ruins that I have yet seen in the country. As to Tel el Hammam, I have been unable thus far to find any clue to its ancient name. Of Tel Ektanu I shall speak further when considering the site of Zoar.

Let me ask you to bear in mind the fact that what I have called, for convenience, the Shittim plain proper—*i. e.*, the southern and main portion of the whole plain, has upon it a group of five tels or mounds, situated only a few miles from each other, all of which have ruins upon them, and three of which we can identify with cities which existed in the time of Joshua. I think we have a right to suppose—indeed the historical notices are conclusive on this point—that these cities did not spring up in Joshua's time, but that they existed upon these sites from the earliest occupation of the valley.

In making any suggestions at this point in regard to the site of Zoar, about which there have been various theories, it will be necessary to notice the account of the view which Lot had when he stood with Abraham on a hill near Bethel and looked down the Jordan valley towards the Dead Sea. (Gen. xiii, 10.) As the tenth verse of the XIIIth chapter of Genesis is rendered in our English Bible, the sense is not very clear; but it will become so when we read, as we should, all the middle portion of the verse as a parenthesis, as follows:

“And Lot lifted up his eyes and beheld all the plain of Jordan (that it was well watered everywhere, before the Lord destroyed Sodom and Gomorrah, even as the garden of the Lord like the land of Egypt), until thou comest to Zoar.”

The last clause qualifies the first. Lot saw all the plain of Jordan as far as Zoar, or until you come to Zoar. Zoar was both the limit of the plain and the limit of his vision in that direction, as far as the land was concerned. How much of the Dead Sea he saw is not stated; but no human vision, unless miraculously aided, could reach to the southern end and distinguish anything; while from the point where he stood the greenness and beauty of the great Shittim plain are distinctly seen. I make this remark because it has been advocated by some writers that the Zoar of Moses and Lot's time was at the south end of the Dead Sea. Such persons suppose it to be implied in the passage just quoted, that Zoar, *thus situated*, could be seen from the point where Abraham and Lot stood. But I think it is to do violence to the language and to the facts of the case to attempt to make the phrase “all the plain of the Jordan” include the salt marsh at the southern end of the Dead Sea, which is fifty miles from that river, and has nothing to do with it. Indeed, the region there belongs to another water-system altogether—entirely distinct from that at the northern end of the Dead Sea, with which the Jordan is connected. (Compare the significant phrase found in Josh. xv, 5, “unto the end of Jordan.”)

The plain which Lot saw as being “well watered everywhere” would continue so unless so great geological changes followed or accompanied the destruction of Sodom and Gomorrah as to cut off the water-supply from the neighboring mountains, which is nowhere stated or even hinted at, nor are there in the region itself any geological evidences of such a change or convulsion.

If Lot saw the plain of Jordan as far as Zoar, and observed that it was well watered everywhere, the inevitable conclusion is that the place must have been at the north end of the Dead Sea. This is an important point gained. It is a fact which cannot be ignored, and which must be considered in any discussion of the question of the site of ancient Zoar.

The same fact is brought out in the account given in the XXXIVth chapter



of Deuteronomy of the view which Moses had of the promised land, including the Jordan plain. The statements in this passage are clear and the order of events is systematic. Moses, we will suppose, was standing on the summit called Siaghah, near to Mt. Nebo, or one of the Nebo group of hills. He first looked north and saw Gilead and Naphtali; then, turning to the west, he saw Ephraim, Manasseh, and all the land of Judah; he next turned to the south, and he finishes by looking down upon "the plain of the valley of Jericho unto Zoar;" and this plain and valley, at whatever point Zoar was situated, were at his very feet. One standing where he stood cannot fail to realize the force of the Hebrew words of the third verse of the chapter referred to, namely: *ciccar*, which includes the plain on both sides of the river; and *bikath* (valley), which signifies a great cleft between mountains. The mountains appear here as if they had been spread apart, and the plain been sunk far down between them. If Zoar is to be located at the southern end of the Dead Sea, this passage in Deuteronomy becomes confused, and the words "the plain of the valley of Jericho unto Zoar" have no intelligible meaning. Hence the view of Moses, like the view of Lot, appears to bear directly upon the question of the site of Zoar. And it is so evident that it hardly needs to be stated, that any hints bearing upon the true site of this city help us also in attempting to locate the sites of what are called the "cities of the plain."

The question as to these sites is, perhaps, not so indefinite and uncertain as has sometimes been supposed. Many of those who have taken a prominent part in this discussion had little or no personal acquaintance with the region about the Dead Sea. It would seem that a thorough acquaintance of that kind would be an essential requisite to an intelligent consideration of such a subject. My purpose, at present, is not to appear either as the advocate or as the opponent of any existing theory as to the site of the doomed cities, but to state as briefly as possible the results of my own personal researches and observations. I went upon the ground without any theory of my own, and uncommitted to any theory that had been proposed by others. In all my researches I aim to go upon the principle, that if I am conscientious and careful in collecting facts, the theories that are subsequently evolved from them will be more likely to correspond with the truth. I will now give a summary of the facts bearing upon this question:

1. A tradition has existed in past ages that the cities of the plain were submerged. Indeed I have seen, in ancient maps, Sodom, Gomorrah, Admah and Zeboim represented, at convenient distances from each other, at the very bottom of the Dead Sea. For instance, Thomas Fuller's quaint book, "A Pisgah Sight of Palestine," A. D. 1650, has a map which places them in this manner; and represents them as enveloped in flames, notwithstanding the fact that they are 1,300 feet deep in water. But for this tradition there is no warrant in the Bible; and, besides, it is established beyond dispute by geological researches that the surface of the Dead Sea was never *less in extent* than it is at present. During past geological periods it has gradually contracted to its present limits. I have, myself, traced an old shore-line distant about two miles from the present one. It is evident, beyond question, that the sites of these cities are not to be looked for at the bottom of the sea.

2. The supposition that the shallow water south of the peninsula, or El Lisan, covers these sites, has, for the same reasons, no foundation, and is to be abandoned in like manner. Dr. Robinson advocated this theory; but I am sure he would have been the first to reject it, had the geological facts been known to him which modern researches have brought to light.

3. There is no warrant in the Bible for supposing that the *sites* of these cities were destroyed when the cities themselves were, or that they were obliterated, or that the region about them became desolate in consequence of their destruc-

tion. Indeed, there is a passage in Deuteronomy (xxxii, 32), where "the vine of Sodom and the fields of Gomorrah" are spoken of in such a way as to indicate that this was far from being a barren region.

4. If the region where these cities stood was once fertile, it must always have remained so unless, as I have before stated, some great geological change cut off the water-supply from the neighboring hills.

5. The region at the southern end of the Dead Sea is a salt-marsh and desert, with only a narrow belt of inhabitable land skirting its eastern border at the foot of the mountains; it is not now and never has been a suitable place for cities.

6. On the other hand, at the north end of the Dead Sea, there is a large and fertile plain, which has been occupied by flourishing cities ever since the days of Moses and Joshua at least, if not from a period much more remote.

7. In speaking of the tel-system of the Jordan valley, I have shown that the ancient inhabitants built their cities upon natural or artificial mounds, and not down upon the flat lands of the plain itself; and I have stated the fact that such tels or mounds, covered with ruins, exist at the northern end of the Dead Sea, while there are none at the southern end.

8. As we can identify some of these tels with places which existed in Josephus' time, and still further back with cities which existed in the time of Joshua, it is not unreasonable to suppose that these tels were occupied by cities in the time of Lot and Chedorlaomer. If we have historical evidence that these mounds were eligible sites for cities for a period of fifteen centuries before the time of Christ, and during that period were occupied for that purpose, we may be justified in supposing that they were thus occupied from the earliest advent of man in that part of the country.

9. With regard to the account of the view of the Jordan valley which Lot had, or of that which Moses had, in both of which Zoar is mentioned, any justifiable rules of interpretation compel us to look for the site of Zoar, which was one of the doomed cities, at the northern end of the Dead Sea.

10. Only five sites are required, namely: Sodom, Gomorrah, Admah, Zeboim, and Zoar; and on the Shittim plain we have exactly five sites—Tel Kefrein or Abel Shittim, Tel er Rama or Beth Haram, Suweimeh or Beth Jeshimoth, Tel el Hammam and Tel Ektanu.

11. What are termed the "cities of the plain" appear to have formed a group in rather close proximity to each other, because cities that are many miles apart cannot be said to be destroyed by one and the same conflagration. Hence, if we find their sites at all, we should expect them to be quite close together; and this is precisely the case with the five sites to which I have just referred.

12. It is important to remember that Zoar formed one of the group that were to be destroyed. It was near the others and in the same plain with them, but nearer the mountain than any of the rest. As Lot, who had not time to flee to the mountains, wished to make this city his temporary refuge, it was spared on his account.

13. In the account of the catastrophe, all the time allowed to Lot to flee from Sodom to the "little city," which was his temporary refuge, was from dawn to sunrise. The fatal objection to all the hitherto proposed sites of the "little city" is that they are several times too far from the scene of the disaster, whether the cities that were destroyed are placed at the southern or at the northern end of the Dead Sea. Zoar, consequently, must form one of a group of cities, as I have said, and this fact must be borne prominently in mind, in any attempted identification of its site.

These thirteen facts, now stated, seem to be fair and reasonable. They are forced upon us by an examination of the Hebrew record of the event, in connection with careful researches upon the ground itself; and they all appear to have

a legitimate and important bearing upon the question which we are trying to solve. But is it possible for us to come to any more definite conclusion as to the site of ancient Zoar? I think we are able to decide with strong probability, if not with absolute certainty.

In the group of mounds which exist on the Shittim plain I have referred to one called Tel Ektanu. This is, in some respects, the most remarkable one of all this cluster of ancient sites. In the first place, the ruins upon it appear to be of a very great age. Again, its position deserves notice, since it is nearer the mountains of Moab than any of the others; and although it cannot be reckoned as one of the foot-hills, it is so situated as to command an extensive view of the whole plain around and below it. I learned the name from some of the most intelligent of the Arabs who belong in that region—questioning different persons on different occasions, that there might be no mistake about it. They could, however, give no account of the origin and meaning of the name, except to say that it was very old. They said, also, that the ruins upon this tel were the most ancient of any that were known to them. The name itself has no meaning in Arabic, and we are compelled to look elsewhere for its origin and signification. It appears to be the Hebrew word *Katan*, which means "little," or "the little one." Zoar has the same meaning, and the two words are synonymous. This signification is appropriate for this tel, as compared with the others. It is a well-known fact that the Phœnicians had, in ancient times, one or more cities named *Katana* or *Katane*.

If the cities that were destroyed were at the northern end of the Dead Sea, this Tel Ektanu would be exactly in the direction which Lot would take, if his intention was to hasten to the neighboring hills, or towards them, for safety; and its distance from the rest of the mounds corresponds well with the time allowed the fugitive—namely, from dawn to sunrise. The fact that one Hebrew word has been substituted for another identical with it in meaning—*i. e.*, *Katan* for *Zoar*, ought not to be urged as an objection to identifying Tel Ektanu with the site of the "little city" to which Lot fled, provided all the other circumstances of the case point to it as the real one. Besides, it is much easier to understand how this substitution could have taken place than it is to understand how the name "*Bela*," by which this place was known in Chedorlaomer's time, could have given way to *Zoar*.

The anonymous critic already referred to thinks he has overthrown this whole attempt to identify *Ektanu* with the Hebrew word *Katan* by asserting that "these words resemble each other only in their English transcription—the *t* of *Katan* being the Hebrew *teth*, and the *t* of *Ektanu* being the Arabic *ta*—two letters," he continues, "*which never interchange*." To which I reply that we have the Hebrew word *katal* written with a *teth*; while the same or the corresponding work in Arabic, *katala*, is written with a *ta*—precisely the change which this critic says can never occur. If this person had examined any standard Hebrew grammar or lexicon, he would have seen that the change which he asserts to be impossible is recognized by the authorities as existing and occurring in certain cases. (See Gesenius, Fürst, Böttcher, Ewald and others.)

To sum up, I would say that, in my judgment, they are not merely accidental circumstances: 1. That this tel should be one of a group of five, the exact number required by the Scripture narrative, and all of them ancient sites. 2. That it should be in the same plain, but nearer the mountains of Moab. 3. That the direction and distance should correspond minutely with the requirements of the Biblical account. 4. That the ruins upon it should be some of the oldest in the country. 5. And that the name it bears should have no meaning in Arabic, but be apparently the Hebrew word signifying "the little one," which is the precise meaning of the name of the place to which Lot fled.

After a thorough examination of the region itself, and a careful consideration of all the facts bearing upon the question, I think there are unanswerable arguments in favor of the opinion that the "cities of the plain" were situated at the northern end of the Dead Sea, and upon the mounds whose names I have given, and that Tel Ektanu is identical with the site of ancient Zoar.

It is a matter of great interest to know that some of the apparent difficulties connected with the Bible have been solved or dissipated by the researches that have been made in the Holy Land. One of these is with regard to the vast number of inhabitants which the country is said to have possessed, and the great fertility which it is alleged the country formerly enjoyed. And in the time that remains to us this evening, I propose to invite your attention to a *general summary of the evidence for the fertility and populousness of this region east of the Jordan in ancient times.*

Many persons suppose that, besides a fertile belt of country skirting the Dead Sea, the river Jordan and the Lake of Tiberias on the east—large enough, perhaps, to make, comfortably, a dozen western farms—the rest of the region is swallowed up in the great Arabian desert and the great Syrian desert of the Euphrates. The phrase "Hauran desert," so commonly used, is misleading, because that region is one of the most fertile on the globe. But much of it is "a desert," in the sense of being neglected and occupied only by wandering tribes. The fertile portion, however, that I shall speak of is about 150 miles in extreme length, and 40 miles in average width, giving an area of about 6,000 square miles. This is by no means the whole of the fertile territory east of the Jordan, but it is all that comes properly within the limits of Palestine.

I. In considering the proposition just stated, let us glance first at the *people* who have occupied this region. 1. For some centuries previous to the Moslem conquest, in A. D. 635, the population was largely Christian, industrious and peaceful, with churches and schools, enjoying the benefits of education and religion. 2. Before them were the Romans, who filled the land with temples and public works, which they adorned with the highest art. 3. Before the Romans were the Nabatheans, who are described as united and peaceable, enterprising, and considerably advanced in culture and wealth. When a Greek army was sent by Antigonous, the successor of Alexander, three centuries before the birth of Christ, against Petra, their capital, they were routed and slaughtered by these little-known people of the desert. This was the first introduction the Greeks had to these inhabitants of the desert; and the Assyrian records which have recently been brought to light show that, six or seven centuries before Christ, the Nabatheans were a powerful kingdom, and able to offer a formidable resistance to the disciplined armies from the Euphrates. 4. As we cannot give accurate details of the period intervening between the Nabatheans and the Hebrews, it will be sufficient for our present purpose to mention the Israelitish occupation, when the desert bounded their country on the south and east, the Jordan on the west, and Mt. Hermon on the north. The children of Israel—*i. e.*, the two and a half tribes that occupied that region—were possessed of wealth, and could at one time command over 40,000 valiant men of war. 5. Before the Hebrew invasion under Moses and Joshua, the land was occupied by the Amorites, under the leadership of the famous kings Sihon and Og. 6. And history reaches yet further back, even to a race of giants who had flourished and grown old upon this soil, and whom the Elamite king Chedorlaomer once subdued, at least six centuries before the time of Moses. I have found in at least half a dozen places east of the Jordan some remarkable Cyclopean remains, which I have good reasons for supposing date from the people called "the giants," or the people that had flourished and grown old here before the advent of the Hebrews. If we except the twelve centuries that have elapsed since the

Moslem conquest, this region has always been inhabited by people who were distinguished by enterprise and strength, or by intelligence and wealth.

II.—Again, we learn from the cuneiform records that the provinces east of the Jordan and the Dead Sea were invaded by the Assyrian armies as many as six or more times previous to the year 600 B. C.—a fact which shows that these lands, with their cities and people, were regarded by those Romans of Asia as enviable objects of conquest. It is noticeable that these stone pages of history mention that the conquerors took back with them from this region immense spoil—silver and gold and camels and costly articles that had been captured or paid as tribute or ransom to the victorious king.

III.—One of the most striking and convincing proofs of the populousness and prosperity of this region in ancient times are the ruins which literally dot its surface from the Jordan and the Gilead hills eastward and southward to the very border of the desert. Whoever has passed through this East-Jordan land is surprised at the number and magnificence of these ruined towns. Amman and Gerash, Kunawat and Bozrah, vie with Palmyra and Baalbek in the splendor and beauty of their ruins. At Gerash two streets ran through the city, crossing each other at right angles, one of them over a mile in length, and both of them lined on either side with columns. Three hundred columns still stand upright amid these ruins—a mere remnant of the forest of columns that once adorned this city, which does not now boast a single inhabitant! We speak of the “multitude of ruins,” of the surface of the country being “dotted with ruined towns;” let us look closely at the evidence and see for ourselves that these general statements are not exaggerations. The accurate Wetzstein, a former Prussian consul at Damascus, whose book is a standard work upon the Hauran, counted from the castle at Bozrah as many as thirty ruined towns on the plain about that city. Dr. J. L. Porter, who by his researches and writings has rendered very important service to Biblical geography, stood once upon the castle at Salchad—the Salcha of the Old Testament—and counted not less than thirty ruined towns and villages from that commanding spot. From the ruins of Melah es Sarra, some hours east of Salchad, the Rev. W. Wright, formerly a missionary in Damascus, counted as many as fourteen ruined towns within sight from where he stood—i. e., in the southeast direction toward the desert. At 'Are, an intelligent Druse, from whose house-top I overlooked the surrounding country, pointed out to me upwards of forty ruined cities and towns, most of which he called by name. Clustering about Kunawat, the Kenath of the Old Testament, there are the ruins of a dozen or more important places, some or all of which, in ancient times, were doubtless dependent upon the chief or central city; so that the group strikingly illustrates the Hebrew phrase, “Kenath with her daughter towns.” The places already referred to are either south, or in the most southern part, of the Lejah, the Argob of the Old Testament; while the northern part of the Lejah, and the eastern and the surrounding plain, is likewise covered with ruins. Consul Wetzstein is authority for the statement that this eastern portion of the Lejah and the slopes of the Hauran mountains contain at least 300 ruined cities and towns. It should be mentioned that a town of ordinary size contains 600, 800, or 1,000 houses. In the ancient Gaulanitis, lying between the Lejah and the Lake of Tiberias, Dr. Porter has stated that he had a list of 127 towns and villages, all of which were deserted with the exception of eleven. Among these random data no reference has been made to the cities, towns, and villages in the Gilead hills, in the Jaazer region, directly north of Heshbon, or in Moab, where they are numbered by scores and hundreds. I think that, taking the country from north to south and from east to west—go where you will and in whatever direction—you will come upon an important ruin in every half-hour of travel. I do not know where else on the



face of the earth there is anything to equal or even to compare with the ruin-dotted surface of this East-Jordan land. Among these ruins I have myself visited and examined upwards of *sixty ruined churches*. I have examined and measured eleven of the *thirteen theatres* which there exist, including one vast naumachia, or place where mock sea-fights were held. The smallest of these would seat 3,000 people; and the largest, at Amman—the Rabbath Ammon of the Bible—which I measured a few months ago, would actually seat 10,000 people. Of these theatres the one at Kunawat, the two at Gerash, the one at Bozrah, one of those at Amman, and one of those at Gadara, could easily be repaired and made ready for use again, at an expense of only a few thousand dollars. Three theatres at Gadara, two and a naumachia at Gerash, and two at Amman—how could the citizens of these places have needed so many costly structures of this kind? At the warm springs of Gadara, three miles from the city, there was a beautiful theatre for the accommodation of those who frequented this famous pleasure-resort of antiquity. It is possible that the smallest of these theatres may have been roofed over, but generally they were open to the sky unless covered by awnings. In some cases they were so built as to command a fine view of the surrounding country. That one in the western part of the city of Gadara is especially worthy of notice on this account. The view is not only extensive, but beautiful and magnificent. The spectators, while enjoying the play, could overlook, from their seats, the finest portion of Palestine. Five great fortresses were in sight; the whole country, from white-capped Hermon in the north far down towards Jericho in the south, filled with flourishing cities and towns, was before them in the distance; and sunk below them to a vast depth was the Jordan valley, with the river winding through it; while almost at their very feet was spread out the charming Sea of Galilee, covered at that time with vessels, and surrounded with cultivation and life. And as this is but a specimen of the marvelous views which may be obtained from many of the mountain-summits of the Holy Land, I sometimes feel that I can forgive its ancient inhabitants for choosing these hill-tops as sacred places. Yet it should be remembered that the groves, the attractive scenery—all that was beautiful and enchanting in such localities as these could not save the people from the grossest idolatry and the most lascivious rites.

IV. I have mentioned that I visited as many as sixty ruined churches. But I visited only a portion of those that still exist; and how many existed in former times it is now impossible to tell. Among these were cathedrals; and several of the larger edifices must have been erected at great expense, since they are spacious, splendid structures, and adorned with the highest art. And to give a hint of the extent of Christian influence in this region during the early centuries following the birth of Christ, I will mention that at one time Bozrah had seventeen bishops subject to his archbishop, and Damascus, Seythopolis or Betshean, and Petra, had respectively twelve, seventeen, and twenty-three bishops subject to their archbishops. The ecclesiastical provinces of Damascus and Seythopolis included some territory not embraced in the East-Jordan district which we are especially considering; but with this small reduction the bishoprics that remain are numerous, and the churches were no doubt reckoned not by scores but by hundreds.

V. A fifth fact illustrative of the condition of this country in former times is that of the Roman roads. According to my own estimate, which I have made with considerable care, there were east of the Jordan, between Petra on the south and Damascus on the north, not less than 500 miles of road, touching all the important cities in that region and leading to the seaboard. These roads were built upon honor. The engineers were skillful, and the workmanship was substantial and enduring. Some of their bridges still remain, together with



perfect sections of their roads here and there—surprising monuments of the character of the Roman people. Hills were cut down, streams were bridged, a solid road-bed made of gravel, sand and cement; on this bed a pavement of squared stones was laid; the line of the road, wherever the country would admit of it, was as straight as an arrow; the width of the roadway was pretty uniformly twelve feet; each side was lined with curbing-stone; and at proper intervals there were stations for watchmen and overseers, and others for relays of horses. On these roads they traveled 100, and sometimes 200 miles in twenty-four hours; and at certain points I have found the ruts which were worn in the pavement by the chariot wheels. Whenever in "the wilderness beyond Jordan," I find a section of a Roman road that is well preserved, I always stop to admire the substantial workmanship which it displays, and especially to reflect upon the character of that government and people—that state of civilization which demanded such convenient but costly means of intercourse. What a contrast in this respect between the Romans and the Turks! *Those* a people who made the land a paradise; *these* a people who turned the paradise into a desert.

VI. A sixth fact which must be considered in judging of this country in former times is that of the *inscriptions*. Perhaps 2,000 Latin, Greek, Nabathean and Palmyrene inscriptions have been collected here, which furnish a multitude of details with regard to the government, religion, arts and social life of the different races and peoples that once flourished on these now deserted and desolate plains.

VII. A seventh fact bearing on this subject is the evidence which the existing remains afford of the complete system of *irrigation* which the ancient inhabitants perfected and employed. Details with regard to the numerous wells, cisterns, aqueducts, and vast reservoirs which were provided, cannot now be given; but we will simply refer to the valley of Jabbok as an illustration. This valley is perhaps seventy miles long and half a mile to two miles in width; and in ancient times every acre of it was reached by irrigating canals. Only the best portions of it are now under cultivation. The present owners of the soil never dig any canals, but whenever they wish to plant a certain piece of ground, they clear out and repair an old one. The Arabs say they did not make these canals, and that their fathers did not make them; but they have existed here from the oldest time. Some of these I have traced for five or six miles along the side of the hills or mountains, and the skill displayed in their construction—leading them under ledges and around bold, rocky headlands—shows that their builders had more means and intelligence than any people that have been settled here since the Moslem conquest. These could have been built by the Romans; but as this valley was settled and cultivated in the Hebrew times, it is more probable that they date originally from that remote period.

With regard to the populousness of the country east of the Jordan in ancient times, I think the evidence is cumulative and overwhelming. In every age previous to the Moslem conquest in A. D. 635—running clear back to the time of the giants—this land has been thickly inhabited, generally by intelligent and wealthy people. Churches, theatres, palaces, temples, castles, baths, porticos, splendid roads, a multitude of inscriptions, remains of a perfect system of irrigation, historical notices of cathedrals, bishops, and a wide-spread Christian influence, notices of conquests and vast spoils falling into the hands of the victors, authentic notices of many successive and powerful races that have flourished here, and the surface of the whole country dotted with ruined towns, cities and villages, are convincing proofs that the statements found in the Old Testament respecting the numbers of their armies and people may be accepted, so far as the capacities of the soil for supporting such a population are concerned, as the literal truth.

Palestine has suffered terribly under the oppression of the Turkish government, which has succeeded in reducing the country to a desert, and its inhabitants to the condition of beggars. But under a good government there is no reason why this interesting land should not be restored to its ancient state of fertility and beauty. When the favorable time comes, I believe that these ancient highways of travel and commerce will again be opened ; that the deposits of coal, lead, copper, iron, bitumen, sulphur, and salt will be worked with splendid results ; that the cities and towns will be restored and become again the centres of industry and the homes of people of intelligence and enterprise ; and that the ruined churches and schools will be again rebuilt.

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At the close of Dr. Merrill's address, the Rev. Wm. M. Thomson, D. D., said he wished to indorse all Dr. Merrill had said with regard to the interesting remains east of the Jordan, and to impress upon the minds of the audience the importance of the work which the American Exploration Society had undertaken to do. In his judgment, Dr. Merrill had exhibited unusual tact in dealing with the wild Arabs, as well as a remarkable power of physical endurance in that inhospitable climate. These facts, added to his archæological ability, fitted him peculiarly for this work ; and he hoped the Society would send him back to Syria as soon as practicable.

## MY FIRST TRIP UP THE MAGDALENA, AND LIFE IN THE HEART OF THE ANDES.

By J. A. BENNETT (late U. S. Consul at Bogota, South America).

We left New York on a bright cold day in January, upon the schooner *China Samaria*, and on the seventh day were sailing through Mono Passage, with the island of Santo Domingo on our right hand, and Puerto Rico on our left. A fresh trade-wind swept us rapidly through this beautiful channel, and out upon the Caribbean sea. On the sixth day thereafter, we found ourselves gazing through vapory clouds at one of the grandest Sierra Nevadas on earth. Santa Martha's great mountain stands like a sentinel of the sea, the base washed by the ocean, and three and a half miles above the troubled waters the snow upon the embattled crest reflects the sunlight in quiet peace; but the winds rush down its giant sides with angry growl and roar, and our little craft of seventy-five tons reeled beneath the pressure.

Many miles distant from the mountain we used to lie down upon the deck of the vessel, in order to secure a complete view of its summit. This Andean monster is near our first point of destination, and within half an hour we sail into the harbor of Santa Martha; before us lies the sleepy town, in the lap of great mountains.

The prominent features of Santa Martha are its cathedral, custom-house, and Moro castle, which latter is built upon an immense rock at the entrance to the harbor. This town was the first settlement on the coast, and occupies a large place in the history of the Conquest. The buildings are constructed of sun-dried bricks, with walls from three to four feet thick, and roofed with red tiles; they are, with few exceptions, one-story high, and built in that manner for greater security to life in event of earthquakes, with which Santa Martha has been fearfully shaken. These people respect an earthquake, and build their houses accordingly.

Having letters to a prominent resident merchant, Don Joaquin de Mier, we called to pay our respects, and were kindly received. I mention this gentleman from the fact that when General Bolivar—who has been called the "Washington of South America"—fled for his life from Bogota, the same Señor De Mier received, and protected him. He conducted Bolivar to his country seat, San Pedro, and endeavored to cheer and divert his mind from the ingratitude of his countrymen. But the effort was vain, for in a few weeks he died of a broken heart, only 47 years of age! Twelve years passed before his native state, Venezuela, petitioned New Grenada for his remains! The request was granted, and all that was mortal of the immortal Bolivar was disinterred and reburied at Caracas, amid great display.

After a detention of 20 days in passing our goods at the custom-house, which were then securely placed in our boat, or *bungo*, we stepped on board, and bade good-bye to Santa Martha. A bungo is a queer-looking craft, and may be called an overgrown canoe. It is made from the trunk of a single tree, and will carry from 20 to 100 cargoes; a "cargo" is a mule's load, packed in two boxes or bales, and weighing 125 pounds each. The bungo in which we embarked was sufficiently large to transport 50 cargoes; she had a mast and square

sail; a *patroon* (captain) and six *bogas*, as the men who navigate such a craft are called. With a brisk trade-wind, in half an hour we were skirting the shore of the Caribbean sea, and as our bongo had no keel, and was much the shape of a barrel, we rolled uncomfortably until 6 o'clock in the afternoon, when, shooting through the breakers into Cienega Grande—a large marshy lake—we were again on smooth water, and presently drew to the shore at Pueblo Viejo. We hung our hammocks in a house near the lake, and endeavored to forget our weariness in sleep; but long before daylight the continuous hum of voices induced us to leave our hammocks to ascertain the cause of disturbance at this unwonted hour. Upon opening the door we gazed upon a scene that filled us with surprise and pleasure. From the front of our house to the border of the lake is the Plaza, or market-place, and moonlight revealed to us many groups of women and children selling fish, vegetables, fruit, salt, and cotton fabrics, who had come in canoes thus early to avoid the heat. Along the shore, and extending out on the lake, we counted some forty canoes moored, and others, gliding back and forth, with gaily dressed women propelling and directing them. The beautiful islands, the placid waters, the thickly-clustered canoes, the picturesque groups of the market-place, the old village, and the bright tropical moon looking down upon the scene, even now rises before me as a "thing of beauty." The Sabbath is market-day in Spanish America. The majority of the people live far away from marts of trade, and Sunday they attend mass, buy and sell—thus "killing two birds with one stone." But when the host is elevated, which is known by the ringing of a bell, trade is suspended—even if they are in the midst of an important negotiation—their hats are lifted, and one and all fall upon their knees, on the pavement, devout worshippers.

We left Pueblo Viejo at mid-day, and in passing over Cienega Grande saw, for the first time, villages built on spiles. The inhabitants gain a livelihood by supplying fish to those living on the adjacent shore. There is also another class of fishermen inhabiting these lakes, called *caymen* (alligators), that are fearfully numerous, and often measure 25 feet in length. It is no uncommon thing to see at one time 20 or 30 horrible heads thrust above the water, with huge distended jaws containing fish, which the monsters swallow with a snap and then disappear.

After a five-hours' sail we had crossed the lake, and entered the picturesque pass of Rinconada, which conducted us into Cienega Laredonda. Here we anchored until the moon came up, when we continued our journey, but with great labor, the entire surface of the waters of this lake being covered completely with a rank and dense vegetation, through which, at times, it was hardly possible to move our bongo. Here, too, we had our first experience with mosquitoes—they came singly, in squads, brigades, and whole armies, and stuck to us closer than brothers, until the fresh wind of the morning swept them away.

Emerging from Laredonda, the thick vegetation disappeared, and the remaining portion of our journey to the river was unobstructed. On Tuesday we arrived at Barranquilla, having sailed through seven lakes and six natural canals. All importations and exportations, via Santa Martha, are transported through these inland water-courses, which, though a laborious and expensive undertaking, is less so than by the way of Carthagena.

We had now reached the Magdalena river, which rises in the Andes, near the frontier of Ecuador, and, after a sinuous course of 900 miles, enters the Caribbean sea. Navigation to and from the sea is not usual, as the ever-changing channels, shallow and dangerous currents, render it hazardous.

The principal affluents of the Magdalena are the Cauca, the Sogomoso, and Bogotá. It is navigable up to the rapids at Honda, 600 miles, and beyond the rapids 150 miles, through a rich and thickly populated country.

The most important town on the Magdalena, commercially speaking, is Barranquilla. Here goods for the interior are transhipped to boats and steamers. The port of Savanilla is only eight miles distant, and is now connected with this town by railroad and canal. Some of the importations, and the greater part of the exportations of the republic, are made through Savanilla. Barranquilla has a population of about 10,000. It is better built than Santa Martha, and the people are engaged in more active pursuits than in any other town on the river. When we left New York we had expected to make the trip in one of the two steamers recently placed on the river, but they were aground, and our only alternative was to continue on in our bongo.

On Wednesday we left Barranquilla, and the next day arrived at Calamar. This place derives its only importance from the fact that a canal, constructed by the state, leaves the Magdalena at this point, and unites its waters with those of the harbor of Cartagena. It has not, however, much improved the commercial prosperity of that once famous city.

Cartagena was renowned in history 200 years ago. It was founded in 1533 by Don Pedro De Herredia, and is the most magnificently walled city in America. These walls, erected near 300 years ago, stand to-day as firm and strong as at the hour of completion, without breach, crack, or the least injury. They are sufficiently broad for a public highway, if required, and the surface is like granite. The process by which they were concreted is said to have perished with the life of the discoverer.

In a recent earthquake, when the massive walls of churches and convents were dangerously cracked, those of the city were uninjured. The harbor, seven miles long, is one of the most beautiful on this continent, and is well fortified. For more than 100 years it was the point of greatest commercial importance in the New World. Cartagena was the grand entrepot of South America; here was the only Spanish custom-house, and it gave to the mother-country an immense revenue. From here the luxuries of Europe were sent by water and mule—a thousand miles into the interior—to Lima, Equador and Callao. The population, at the time of Cartagena's highest prosperity, may have been 50,000, but at the present is hardly 20,000. Among the public edifices are churches, convents, town-hall, hospitals, theatre and college. A line of English steamers, connecting the city with Aspinwall and St. Thomas, touch there twice each month. The Spanish army evacuated Cartagena in 1821, driven out by the army of the Republic.

Let us now return to Calamar. We continued our trip up the Magdalena, and on Friday morning arrived at Barranca, a small, meanly-built town. From this point to Cartagena is the road which has been traveled 300 years; upon which is a village called Turbaco, made notorious by the cock-fighting propensities of General Santa Anna, who, after his expulsion from Mexico, took up his residence here. He built a cock-pit, and Sabbaths and feast-days indulged in this degrading sport. From the house we occupied, I have seen him with his thousand doubloons piled up before him, betting on the result of every contest!

At Barranca we met the steamer Magdalena, which, having got off the sand bar up the river, was on her return to Barranquilla, and we regretted we had not awaited her arrival at that place. After a pleasant chat with the American officers we pushed on up the stream, and were scarcely out of sight when we were startled by the loud report of her exploding boilers. The officers, with whom we had just conversed, and fifteen of the crew, passed thus suddenly to their death.

Our thermometer marked 85° in the early morning, and ran up to 100° as the day advanced. We arrived at Mompox in eight days from Barranquilla. The Magdalena, from the coast to this point, is full of interest. It is a grand



river—in places two and three miles wide; the current flows lazily in parts, but, as a rule, more rapidly than the Mississippi at New Orleans, and, like that river, its waters are very muddy. Cultivation of these rich lands is by no means universal. Corn, tobacco, and sugar-cane attract attention. Bananas, plantains, oranges, lemons, and all tropical fruits grow almost without care, in abundance and perfection. When we behold the broad noisy river, the quiet plain, the reaches of cultivation, the primeval forest, and the glorious mountains, with snow-covered heads, we exclaim, how grand! But let me fill up the outlines of the picture. Birds of beautiful plumage are on the wing and in the trees; parrots and macaws, always in pairs; congregations of monkeys in noisy council; the tiger upon the shore, bellowing to his enemy the cayman, and ordering him out of the way, that he may safely pass over; the wild boar roaming the forest and grunting defiance to all his enemies; the boa constrictor on the border of impenetrable woods, hanging upon trees, ready to grasp his prey and crush it within its contracting folds; the venomous snake, who, unprovoked, will strike you with his deadly fangs; the scorpion, giving life to her young, and then stinging them to death. Here, too, the voice of the mosquito is heard in the land, and at night they come upon you a vast and innumerable host; sand-flies, not larger than a pin's head, are your daily companions, who soon establish a blood relationship with you; and, to complete the picture, the *nigua*, the smallest and yet the greatest torment of all—so small that, when he enters your flesh, sharp eyes only can see him, but, after a stay of fifteen days, you find he has built his house and lodged a thousand of his progeny therein, which must speedily be exterminated or your life may pay the forfeit. Within the tropics, we have literally eternal spring and summer—but that is not all; on every tree we find both health and decay, life and death. Our spring and summer are far more enjoyable and beautiful than any so-called tropical paradise. For in those regions torment and danger are on every side, ignore it as we may.

As we are now on ground made historic by the conquest, allow me for a moment to call attention to one or two facts. Thirst for gold was the inspiring and impelling motive which urged forward the Castilians in their subjugation of Mexico and South America. The dangers they dared, the suffering they endured, the crimes they committed while in their mad search for gold, have no parallel in all history. "Give me gold or I die," was the cry of these desperate adventurers. They rushed into the jaws of destruction, impelled by this ignoble aim; but they thought, with thousands of the present day, that gold was the all of life. If we follow them, as they leave Carthagena and Santa Martha in companies of two and three hundred, we can track them by the ruin and death which marked their pathway. But few of these expeditions were successful in their search for the precious metals, yet almost every page of their history is stained with human blood and unmentionable crimes!

A noble exception occurs to me here. Herredia, the founder of Carthagena, led one of these exploring bands, was absent four months, and returned with \$2,000,000 in gold. He was noted for his humane tendencies, and conducted this expedition in a manner that conciliated the tribes whose territory he invaded. We have instances, though, of his cunning and the peculiar arguments he used in accomplishing his desires. Among the treasures discovered was an image of a wild boar in solid gold, weighing 137 pounds—one of the gods worshiped by the tribe with whom it was found. Herredia interviewed the cacique of the tribe, assured him he could not permit such beastly idolatry, could not see them thus imperil their souls, and therefore he should remove from their midst this great temptation. So eloquently and forcibly did he discourse of the mightier God whom he worshiped, and whom they were constantly and terribly enraging by their idolatry of this special image, that at length the



Indians consented to its removal, and he departed, his conscience satisfied with the logic that had swayed them. Upon the return of this expedition the spoils were divided, and each volunteer was given \$6,000 in gold—the largest amount of money ever received at one time by the common soldier of the armies of Spain in America. Pizarro, who first robbed and then murdered the King of the Incas—Atahualpa—divided among his men \$4,400 each. Hernan Cortes, after conquering Montezuma, King of the Aztecs, gave to each of his followers \$100. The population of New Grenada, at the time of the conquest, was 8,000,000—double the number we had in our Colonies in 1776. The present population of Colombia is not 3,000,000.

After these digressions let us return to Mompox. This city was founded in 1540, seventy years before Hendrick Hudson entered the harbor of New York. It is 150 miles southwest from Santa Martha. Its population is 9,000, but it has been much larger. The temperature ranges from 93° to 98°. The streets are laid out parallel with the river for two miles. There are several churches of imposing appearance, and the houses are much better built than at Santa Martha or Barranquilla. Here are yards for building and repairing river-craft, and at times great activity prevails. As there were no hotels, we hired a house and a cook.

The scenery for some distance above Mompox is exceedingly interesting. The banks of the river are lined with *rosas*—small farms—and the finest fruits of the tropics are seen, as we laboriously work our way past these cultivated patches. At five o'clock we arrived at Margarita, the most beautiful village on the Magdalena. It extends three miles along the river, and the white cottages are completely embowered and overshadowed by orange, lemon, cocoa-nut, mango and tamarind trees. The mangoes and oranges were golden in the sunlight. We purchased 500 of the latter for 25 cents. The people of Colombia have a proverb that oranges are gold in the morning, silver at noon, and lead at night. We noticed many cotton trees, the spontaneous growth of these rich bottom-lands. The cotton is of the finest quality, is sent to England and sold at a high figure. May not these valuable trees be propagated in our Southern States?

Before leaving Mompox we exchanged our bongo for one more suited to the navigation of the Magdalena above this point. We employed a patroon and six bogas to pole us up to Honda. The wind had left us, and from there to the termination of our voyage it was a fight of flesh and blood with an angry, turbulent river.

The *toldo*, or covering of a bongo, is shaped not unlike the top of an express-wagon, in order to carry off the rain. It is constructed of large split cane, and extends about three-fourths of the entire length of the bongo. On the forward deck our cooking was done; aft, we erected an awning, which we occupied with the patroon. Our bogas were all young men, and models for a sculptor. Their life is a hard one, and they never attain old age—seldom see forty years. When at work they are scantily clothed, and I have seen blood running down their backs from the stings of swarming insects. They carry a heavy pole sixteen feet in length, upon one end of which is a wooden fork; this they plant on the shore, the other end against the naked shoulder, when they throw their entire weight upon the pole, walking the length of the toldo. As we had six bogas, they worked in companies of three, and in this manner forced our rudely shaped boat against a current of from four to eight miles an hour, with a tropical sun burning their exposed bodies, while at times the thermometer marked 120°. No slave was ever driven by cruel task master through a more fiery ordeal of suffering—endured, too, with so much patience and courage. For thirty-two days these men worked on uncomplainingly until the voyage was ended, living upon salt meat and plantains, receiving for their completed work

\$14 each—not 50 cents a day! At night, when the mosquito-bars were erected upon the sandy beach, and our watch-fires lighted, the scene was not unlike a tented field, although our bogas did not strikingly resemble regulars, but in the red glare of the fire reminded one of savages, and suggested all manner of unpleasant fancies.

Our mosquito-bars were made of thick checked goods, the same old-fashioned stuff that our grandmothers wore for their check-aprons. In using this material one is protected, not alone from myriads of mosquitoes, but from scorpions, centipedes, and a vast army of unnamed tormentors. You are also shielded from the malarious night-air freighted with death. But the heat! I wish I could convey to you an idea of it. One day, in passing through an arm of the river, the thermometer, under the shade of the awning, marked 130°; at what point, think you, does it stand at night, with the bar tucked in carefully and closely about you? Would that I could describe the sensation experienced the first time one seeks repose under these protectors. In the beginning there is the sense of safety and security; you laugh at the dense cloud of mosquitoes that dashes itself against your bar with a vain cry for admission. Soon, though, you feel an oppressive sense of suffocation, and a strong desire to tear open your bar, if but for one breath of fresh air. Then you remember the enemy without, and by sheer force of will you resist the temptation, but grow more and more desperate each second. "I cannot endure it longer," you think; but you can and must! "I shall die!" you gasp—no, death never comes by this torture. Have patience; one moment more. There! the flood-gates are upon; perspiration starts in torrents, such as you never before dreamed of, and relief is almost instantaneous; you feel positively happy. From this point of experience you are cool and calm, sleeping like an infant in its mother's arms.

Six days of severe toil brought us to Morales. In walking through the town a very natural question arises. What employment have these people? Well, it is difficult to tell. You may dwell among them without knowing how they live. Nothing surprises them except an earthquake! They are never in a hurry; "*mañana*"—that is, to-morrow—meets their wants in times of greatest urgency, and as *mañana* never comes they are always tranquil! When marched out for execution they are undisturbed and do not ask for mercy, but if at breakfast simply beg for time to finish their coffee and cigar! They are always ready to be shot, but never ready to *work* until to-morrow. The enervating climate apologizes for them every hour of the day! Drop a thorough "live Yankee" down there, and twelve months will take all the "go-ahead" out of him! A tropical climate destroys ambition, endeavor, and the love of gold.

The standard of comfort is so low, and wants so few, that the precious metals are almost valueless to them. When the time arrives that a new garment is an unavoidable necessity, they wash the gold from the earth at their own doors—but they wash no more than is absolutely needed to purchase the desired article! Why should they work? These children of the Great Father live on His bounty, and luxuriate in the abundance He has provided for all their necessities. The vast forests which border this noble river afford space for thousands of homes, where any one is at liberty to settle, free of expense.

An enterprising man will take his axe, go into the woods and fell a tree sufficiently large to make a canoe; after it is completed he selects a site for his cottage, clears a space of one or two acres, and begins the erection of his house, which is constructed of cane and roofed with leaves of the palm-tree. Not many days are required to finish it, after which he employs himself upon the grounds. Six months' work, at intervals, will cover his cleared land with plantains, bananas, yuccas, and a variety of vegetables. In process of time his harvest begins to mature. He moves his family into his cottage, swings his hammock, cuts down

the first ripe plantains, hanging the enormous bunches under a simple shed constructed for that purpose, that they may be easily reached, prepares his small net for fishing, and his life-work is ended. A fortune secured in less than one year, the enjoyment of which he enters upon as a reward of his labors. One hour's work every ten days upon his plantation, and it will last a hundred years. The solvency of railroads, savings banks, or insurance companies, do not disturb his contentment, or render unhappy his restful life; his future is insured against any such contingencies.

The tobacco he requires is produced with little labor. Catching the fish his family need is an amusement, and at the nearest town he purchases salt. A stew of fish and plantains is a dainty meal, more relished than roast-beef and plum-pudding. This is a primitive but a satisfactory life for him, and may be far more useful than the phantoms many of us pursue. This man is truly rich, for his independence brings contentment. He would not exchange his home and mode of existence for the wealth and palaces of the Rothschilds. Our hero has reached the goal of his ambition, and enjoys it. The Rothschilds have obtained \$2,400,000,000, and still reach out for more! The contented man of whom we speak smokes his cigar, dreams in his hammock, has a quiet conscience, and no fear of creditors. With him reverie holds perpetual sway.

The plantain is a fruit of such vast importance to the inhabitants of tropical countries that a few words regarding it may be of interest to you. When it is ripe it appears like the banana, though larger, and has a raw taste like an unripe banana. It grows upon a succulent stalk, from ten to fifteen feet high, and from twelve to twenty inches in diameter at base; upon rich soil the fruit becomes very large and the bunches enormous; only one bunch grows upon each stalk, and when it is cut down a "child," as the natives call it, has germinated from the roots of the stalk destroyed, which in turn matures. With little attention, this production may be continued a century on the same ground. When the bunches commence to ripen, the *macheta*, a kind of short sword, is stuck into the stalk, and the weight of the heavy fruit brings it to the ground. Plantain may be eaten in its natural state, but is generally roasted, fried or boiled, and is palatable cooked in any way. More than one-half of the entire population of Colombia subsist principally upon this fruit. It is both bread and meat to them, and is said to contain more nourishment than anything we eat.

A favorite dish throughout the Republic is a stew made of beef, pork, plantain, squash, yucca, potato, and aracacha! Two of these vegetables are unknown in our country. The universal drink of the native population is *chichi*. It is made from rice, also from corn, and is generally used in a partially fermented condition. Intoxication, however, is almost unknown.

Some miles above Morales, the Magdalena puts forth a right arm that runs several leagues, nearly parallel with the river, and may in time become of more importance to the Republic than the principal stream. Upon this arm is located El Puerto Nacional, to which place a portion of the produce of the State of Santander is sent for exportation. Back from this port, up in the mountains, is situated the flourishing town of Cucuta, one of the great centers of coffee production and trade; much of the crop reaches the United States and England through Maracaibo. A few years ago the earth opened and swallowed a large part of Cucuta, and some 10,000 of her inhabitants.

Three days and a half more of work and quiet suffering brings us to San Pablo (Saint Paul), a poor town with a great name, which we shall remember, as the first rain of the season came upon us here. Now another trouble appears, for the river rises rapidly; a swifter current impedes our progress, and the caving banks, falling trees and floating logs require constant care and watchfulness. For two days our brave bogas literally hauled our bongo up stream, by

the limbs of trees; at one time the bank caved, fell upon us, nearly capsizing our craft, and away went four bogas sliding into the river, our prepared dinner disappearing with them. The bogas soon scrambled on board, minus the dinner, however; a little further on, as a sort of addendum to the catastrophe, a decayed tree dashed itself directly across us! Fortunately it broke in falling, thus preventing our shipwreck.

Bogas when at work utter a monotonous sound in chorus, except when in passing under the limbs of a tree they espy a hornet's nest—then they proceed with the least possible noise. One day, not having perceived the nest, they were pushing the bongo up stream with an unusually jubilant sound, when lo! without warning, the hornets, like the Philistines of old, were upon our Sampsons. What then? Was there a shout?—a hand to hand fight with the enemy? Not so! In an instant over they went into the river—patroon, cook, bogas—without one word or sign of parting. We were sitting under the toldo, but hearing the splash comprehended the danger, and immediately covered ourselves with blankets. After remaining a few moments in this hot wrapping, we ventured to look out—not a hornet, not a boga in sight, our bongo drifting down stream as fast as a rapid current could carry us, but not a man to be seen! Presently one head appeared, then another and another, until all came to the surface, when, cautiously and comically peering about, they secured their poles and hats, swam to the bongo, rowed it ashore, and making fast to a tree coolly sat down, and in a moment each man was solemnly removing dead hornets from his hair. Never shall I forget the sight! I laughed until my sides ached, watching their great bronzed figures, sitting in sullen silence, as I recalled their ignominious defeat, worse than Bull Run.

Eighteen miles above this point we reach Angostura, where the river is forced between high rocky embankments. The current here is said to run nine miles an hour. The velocity is fearful! Steamers have been detained here several days, not having sufficient power to force their way through the boiling waters. We started at 6 A. M., and were drawn through the angry pass with hawsers by the strength of all on board, and at 10 A. M. arrived at Nare. Here all passengers for Antioquia disembark, and leaving the Magdalena go up the Rio Nare for a few leagues, where they again land, and then on mules, after days of laborious travel, reach their homes.

Antioquia is the richest state in Colombia, and Medellin, the capital, one of the best-built cities. I think it was during the reign of Philip II, that the Jews were expelled from Spain, and a colony petitioned to be allowed to settle in New Grenada, which was granted. They landed at Carthagena, crossed to the Magdalena, and made their way up that river to Nare, 400 miles. From this point they toiled over high mountains to the table-lands of the State of Antioquia. In the course of time their rabbis and teachers died; they dropped their form of worship, and became Roman Catholics. But their national characteristics of complexion, features and business habits could not be blotted out, and wherever you meet an Antioquian you will say, "That man is a Jew." I have seen no race of men in any part of South America equal to them in form and feature. Their enterprise is that of their nation in this land. The exportation of gold from their state has been for 200 years from six to eight millions of dollars per annum! The gold-fields of Antioquia appear inexhaustible. This state may truly be called the El Dorado of the world. Gold may also be found in great abundance in Choco, and other parts of the Republic. On the Magdalena, after a rain, I have seen the natives washing gold from the earth at their doors.

For more than two centuries, the gold from Antioquia was carried in canoes, down the Magdalena, in charge of but two men—and unarmed at that! It was

delivered at Barranca—transported over the public highways by native Indians, and safely deposited at Carthagena. More than a thousand million dollars have been thus transported without the first robbery ever having occurred; and yet two determined men could at any time have taken the treasure. Suppose a canoe were to pass down the Mississippi, or the Hudson, each month, under like circumstances, how many trips do you fancy would be made without molestation? In honesty, these Indian people are infinitely our superiors. Nare is unhealthy and unattractive. We gave our bogas one day's rest there, and then pushed on to Buena Vista, 45 miles distant. Between these two places are many rosas and an amount of cultivation decidedly interesting.

Acosta is my authority for the following incident as having occurred near this place. The natives of Colombia never having seen a horse until the invaders made their first appearance, were inspired with the utmost terror upon beholding those animals and their riders. They regarded them as centaurs or gods, who had come to destroy them, and their horror was unbounded when they saw the Spaniards dismount! In wild agony they cast themselves down precipices and into roaring torrents, regardless of life. Upon one occasion a company of Spaniards were encamped on the banks of the river preparing to pass over and attack a large force of Indians upon the opposite shore. Three of their horses, tormented beyond endurance by insects, broke from their fastenings, and rushing into the stream, swam to the other side. Instantly the most ungovernable fear and panic possessed the natives. With shouts of terror they turned and fled; the entire force were completely routed, and scattered in all directions!

Thirty miles above Buena Vista is the most dangerous place yet seen. One-half of the river is a bed of rocks, through which the water roars and dashes like an angry monster. Above, the mountains are closing in around us; and their snowy peaks are frequently seen, in our turnings, at the most unexpected times and places. How grandly they stand in the warm light of the morning sun! And just before us, upon a far-reaching plain, is a wonderful, bewildering sight, where a score of hills, whose forms have changed by the washing of ages, rear their fantastic shapes hundreds of feet high. They appear cut and twisted into broken pinnacle, spire and dome, surmounting the buildings of a vast city tumbling into ruins; and as they are touched by the morning sun, it seems as if the torch of the heavens is lighting up the skeleton of the centuries!

And now we are drawing near to *Las Siete Vueltas de la Madre de Deos* (The Seven Turns of the Mother of God). Strange name for seven turns in a river! They are dangerous windings; but the air is more so—at every breath you inhale malaria of the most poisonous character. Within fifty miles of this landing thousands have perished from these pestilential exhalations.

Another day brings us through most picturesque scenes and dangerous navigation; but we land in safety at the foot of the rapids, where ends malaria and the lower Magdalena river. Honda, 600 miles from the coast, has a population of about 5,000, and is situated at the commencement of the rapids we have now reached, which terminate navigation, as to ascend these mad waters is an impossibility. Consequently, all goods for the interior are disembarked here and placed in Government stores until mules are provided to transport the merchandise to Bogota.

While this is being done, let us walk along the foaming rapids up to this 300-years-old town. The terrible unrest of this vast body of water, as it rolls and tumbles over its rocky bed, inspires one with amazement and a sense of fear. It is a continuous and steep slope for three miles; and the mighty torrent, as it rises and falls over its uneven foundation, roars like Niagara, and sends its groans up the mountain-sides, until the distant echoes seem like faint moans of agony!



At length we reach Honda, and pass the Guali river, which plunges through the town in tumult and pours itself into the Magdalena near the commencement of the rapids. Honda means a sling; and as you view the town from some of the neighboring elevations, you can easily imagine it is suspended and swinging between two lofty mountains. The houses are generally built one story high and closely together, with thick walls and tiled roofs. There are several churches. The streets are narrow, but well paved. Two stone bridges span the Guali. There are no hotels, so we hire a house and a cook during our stay. For 100 years the Spanish government made this town the grand depot for European merchandise; and from here it was sent, upon mules, over almost inaccessible mountains to far-off Quito and Lima. From this point the navigation of the upper Magdalena begins; the produce of the upper valley, mountains and table-lands, being brought here for exportation.

Tobacco alone, at one time, was valued at \$6,000,000 per annum; and 20,000 bales of *quina*, or Peruvian bark, are now shipped yearly; also gold and silver, hides, coffee, etc. A few hours' ride from Honda brings one to the silver mines of Santa Anna, now worked by an English company, which have been producing silver for generations, and it is not possible to tell how many hundreds of millions of dollars they have given to commerce. After two days' detention, we embark in a canoe and carefully make our way up the stream, hugging the bank, until our patroon deems we can paddle across without risk of being swept over the rapids. When he gives the orders to push off, it is a moment of great excitement. As we approach the opposite shore, we drift nearer and nearer the dreadful, roaring, boiling, seething torrent; and just when it appears that no power can save us from being drawn into the midst of its terrors, a counter-current catches our frail bark and sends us in safety up to the landing. We find our mules waiting for us, and mounting we start for Bogota. A few hours' travel brings us to the base of Alto del Sargento (The Sergeant), one of the mountains over which we must pass to reach the heart of the Andes. This climbing is no child's play, but hard work for man and beast. Half-way up a heavy shower envelops us in the wet folds of its dark garments, and the lightning plays about us in most uncomfortable proximity; but in ten minutes we come up out of the clouds. Above us is the clear blue sky and bright sunshine; below, the blackness of darkness, pierced through with chain-lightning and filled with crashing thunder!

In two and a half hours we reach the summit—7,500 feet. After riding along the narrow ridge a short distance, suddenly, through an opening in the timber and brush, a view bursts upon us which is far beyond any power of mine to describe. I gaze in silent wonder and devotion. Spread out 7,000 feet below, extending a hundred miles in length and thirty in breadth, is the upper valley of the Magdalena—the river winding through it like a silver ribbon—the villages upon its banks—the hills forming the boundary of this magnificent valley—buttressed by mountain upon mountain piled, until the highest, covered with eternal snow, 10,000 feet above our look-out, forms a frame for the grand picture. Every vestige of the storm has passed, and the shadows of fleecy clouds chase each other across the landscape, as if in wild sport; while lovely Ambalema, with its wealth of agriculture, lies cradled there in silent beauty. The grandeur and magnificence of this view no brush can paint or word-picture delineate.

Continuing our journey along this ridge two or three miles, we begin descending, and soon behold before us the valley and village of Guaduas. This scene is a gem, perfect in setting and detail; and I cannot but think that Mr. Church, our eminent artist, drew the sketch of his renowned picture "The Heart of the Andes" from this lovely valley. Guaduas is a well-built town, with a popu-



lation of 4,000, and stands on the foot-hills of Alto del Trigo—Mountain of Wheat. Its temperature is from 75° to 85°; and it is a place of resort during the dry seasons for persons of wealth, who come here for health's sake from the colder table-lands.

The coffee cultivated near Guaduas is of superior quality; and as its process of cultivation is but little understood, allow me a few words upon the subject. The fruit grows on a shrub much resembling our currant-bush, and but little larger. These stand in hills, intersected by clean paths. The foliage is of an intense green, and when the fruit is ripe it resembles perfectly our red cherries and is most agreeable to the taste. It is then gathered and thrown into large vats, filled with water, and is there allowed to remain a few days, until the pulp decays and rises to the surface, when a sluice is opened and it passes away with the water. The pits are taken from the bottom of the vat, spread upon hides and dried, and placed in sacks. The pits are the coffee we drink.

We left the valley of Guaduas in the early morning, and at mid-day reached the highest point of Alto del Trigo. New and beautiful features of scenery met us at every turn of the road, until at length we entered a cañon, and as we emerged the broad valley of Villeta, flooded with sunshine, burst upon our sight. So unexpected was this view, that for a moment we thought it superior to that of El Sargento. But it is not so vast, although still more wild and incomprehensible. After gazing at the wonderful panorama in speechless admiration, we began the descent—down, down, down, as if there were no end! But at 6 p. m. we arrived at Villeta. Here we waited two days for our cargoes, and had an opportunity to look at the place. It is not nearly so well built, nor is the location so pleasant as Guaduas. The streets are paved with cobblestones, but there are no side-walks. The town has a good church, but poor dwellings. A river runs through the town, whose waters are inky black. The impression made upon my mind by this valley is one of disappointment.

Our cargoes having arrived, we left Villeta on Tuesday, at 8 A. M., our caravan numbering eighteen mules—fifteen loaded, and three with saddles. Up the mountain we traveled without detention until 4 p. m., and still we could see the place we had left in the morning. Onward and upward we went. The road—there was no road, only a narrow path—was so wretchedly bad that, much of the way, our animals sank knee-deep in the mud, then scrambled over slippery clay, where it was almost impossible for them to retain their footing, or over great rocks in which 300 years of travel have worn deep holes.

Night overtook us, and the pall of darkness was so dense we could see nothing—not even the heads of the mules we were riding. We did not try to guide them, as our efforts might have thrown them and ourselves down some steep precipice; so we allowed them to pick their own way, and at 8 p. m. they brought us in safety to El Acerradero. We were up in the clouds, and the transition from 95° to 45° in this rarified atmosphere produced a stinging sensation. After an early breakfast, on the next day, we mounted our tired mules and finished our upward journey, by a ride over the most infamous trail we had yet seen, to Alto del Roble; from which point we commenced our descent to the plains of Bogota. Strange and incredible as it may appear, the entire road from Honda to this Alto del Roble is only a mule-path, which was probably traveled a thousand years before the advent of the Spaniard. There are no words in the English language which can convey an idea of its dreadful condition in the rainy season.

Cases of merchandise are often too large, or of too fragile a nature, to be transported on mules. These are carried upon the backs of men and women over the road we have just described. An extra price is paid for this labor; and we met large numbers of persons engaged in this work—some carrying

cases weighing 200 pounds, and I have heard of one woman carrying 300 pounds from Honda to Bogota! Her figure would not be admired in fastidious society; but she was certainly more useful in her day and generation than many of the more elegant of her sex.

We are now supposed to be 11,000 feet above the sea, and about 2,200 feet above the plains of Bogota. From Los Robles down, the road does not improve; but when we reach the plain we find a good carriage-way, and something over an hour brings us to Facatativa—a town of some 10,000 inhabitants. It is market-day, and the grand plaza presents a scene of great activity. Strange sights and sounds all around us. Hundreds of horses and mules, with their cargoes and human freight, throng the roads leading to and from the town; hundreds more on foot, clad in unthought-of costumes, seem to regard *us* with a curiosity akin to our own. We wait two hours for the arrival of our luggage, and then start out on a good, broad road for the city, lying twenty-five miles before us upon the opposite side of the plain.

We are now again upon historic ground, and as we have a long ride before us, let me try and beguile the time by telling you something about this "Heart of the Andes," and the ancient people who dwelt here. The table-lands of Bogota, over which we are now riding, are 150 miles long and 30 miles wide. They are completely surrounded by mountains, which rise to an elevation of from 1,000 to 2,500 feet above the plain. This region has been in cultivation many centuries; before the Conquest it supported more than a million people, and the Spaniards have been scratching the soil and taking off large crops over 300 years. No fertilizers are used, and deep ploughing is unknown. I doubt if so inexhaustible a soil can elsewhere be found upon the face of the earth. The Chibcha nation, who occupied the plains and adjacent slopes, numbered 1,200,000. They were a pacific race, far in advance of the coast-nations, at the time of the Conquest, and were considerably governed and greatly attached to their rulers. They were an agricultural nation, living absolutely upon a vegetable diet. They had neither sheep, cattle nor horses. Lying, robbery and murder were almost unknown among them. I lived with their descendants nearly ten years, and have no recollection of a murder having occurred during all that time. When we look at the civilization and crime of our country, and compare our moral condition with that of this Indian nation, is it not pertinent to inquire what has caused our deterioration? We consume great quantities of animal food. The Chibchas used only vegetable diet. Can the difference of food make the difference in character?

The Chibchas were brave, and famed for their gallantry in battle. After 300 years of brutal treatment, calculated to degrade the race, we find their descendants still heroic and fearless in act. I have seen whole battalions, composed exclusively of this race, fighting as determinedly and tenaciously as any Anglo-Saxon army. The Chibchas were especially celebrated for the tender care of the women, the sick and the aged. The Lord seemed to have breathed His own great love into the national heart. Their laws were framed and executed faithfully, with a view to recognize woman in her true position in the social scale. These primitive men realized the fact that degrading woman degraded their own manhood, and that elevating her ennobled themselves; that woman is not inferior to, but a part of man. Does Christianity teach anything more sacred? A very unique law was in force among them, the consequences of which were radical and far-reaching, resulting in the peculiar care and tenderness of women to which I have referred. When a wife died the husband was obliged to remain five years unwedded, and console himself as best he could. If the secret of this nation's many virtues rested upon this law, it cannot be too quickly placed upon our own statute-books.

The descendants of the Chibchas are a kind-hearted, gentle people. I have very often met them in the most retired and dangerous passes in the mountains, where they could have robbed and slain one without risk of discovery, but never upon passing them did they fail to lift their hats, and say "*Dios vaya con usted, mi amo!*" (God go with you, my master!) I have employed them in various capacities many years, and never lost anything by them, while my own countrymen during the same time swindled me repeatedly. You may load your mules with gold and silver, as is frequently done, and travel all over the country with these men absolutely without fear or danger. The descent of the Spaniards upon the plains of Bogota has proved a pestilential fire to this noble, virtuous nation. The 1,200,000 have been reduced to 200,000, and these are but "hewers of wood and drawers of water." They are allowed to grow up in ignorance, and are the facile tools of demagogues and unscrupulous politicians. The Chibchas, as a nation—their glory, their manhood, their high aspirations—have been buried in the tomb of Spanish civilization.

Allow me just here to call your attention to the prophetic words of Las Casas, the Spanish historian, addressed to Charles V in 1542: "If the past course of treatment is continued, the Indian nations of South America will be destroyed, and the injury that will result to Spain, the blind will see, the deaf will hear, and the dumb will proclaim! I have not long to live, yet before I go hence my conscience demands that I make this protest to your Majesty, and I call all the saints and angels in heaven and inhabitants of earth to witness this solemn announcement, that unless the laws and penalties for the protection of the aborigines are put in active execution by those empowered to do so, the present population will be destroyed as they have been in the Antillas, and for these sins God has to chastise us with horrible chastisements, and perhaps totally destroy Spain!"

Prophetic words, which are being fulfilled before heaven and earth to-day! Not men alone, but nations reap what they sow. This law is wrought with the universe. The balances are being struck, and to nations as well as individuals a day of reckoning comes, with a like certainty to both. Look at Spain, in all the magnificence of her greatness at the time of the Conquest. Behold her humiliating imbecility to-day. Then think of this prophecy of the tender-hearted Las Casas, uttered 335 years ago. Once she defied the world in arms, to-day she cannot conquer Cuban patriots! Let us not forget, ladies and gentlemen, that our injustice to the red man is being written out in God's book. We, too, must reap what we sow, and be judged by the record of our daily lives in the Supreme Court of the Universe, from whose decision there is no appeal.

During this digression we have passed through a splendid farming country, seeing many fine old residences, until we have reached the village of Fontebaun, which has more the appearance of our own suburban towns than anything we have yet seen. A few miles more brings us to Puente Arranda, one league from the city of Bogota. We have only a partial view of it, but a grand look at the mountains in the background. From this point a broad avenue leads up to the Plaza de San Victorino. This square is given up to bull-fights for one week during the yearly church-festivals. Calle de los Plateros—or "Street of the Silversmiths"—leads to Calle Real, and this, the Broadway of Bogota, conducts us to the residence of the United States Minister, where our journey terminates.

The city of Bogota, famous in history for 300 years as the seat of government, is built upon the eastern side of the plain. It is 8,863 feet above the sea, and back of it the mountains rise 2,500 feet higher, the church of Monserrate crowning the highest peak, 11,363 feet above the ocean, one of the most elevated

situations of any church in the world. Bogota was founded by Queseda in 1538, and has a population of about 70,000. The average temperature of the city is 62°, and will not vary four degrees during the year. The streets and side-walks are narrow but well paved; through the middle of the former streams of water run down the slope, and the city is supplied with an abundance from fountains placed in all the plazas. The buildings are constructed of *adobe*, bricks and stone, with roofs of tile. There are no chimneys, as fires are not required except for cooking, and for that purpose charcoal is used.

Bogota contains a noble cathedral, with dome and towers; twenty-six other churches, many of them beautiful; nine monasteries, three nunneries, three colleges, a university, schools of chemistry and mineralogy, a national academy, observatory, public library, theatre, botanical garden, halls of congress, post-office, custom-house and palatial private residences of great value. Nearly half the city at one time was the property of the church, but the government has confiscated a large part of her vast estates. There are many scientific men there, who generally have been educated in Europe, and the opinion is prevalent that the educational institutions of the old country are superior to those of the United States. Among the white population of the city intellectual culture is more universal than with us. Society is refined, and the pleasures of social intercourse are fully enjoyed. Many persons among us deem that the standard of morality in South American states is below our own. That, I am quite sure, is a mistaken idea. They have the good taste, at least, to refrain from those public exhibitions of questionable manners so frequently seen here.

Millionaires you can count by the score, but the so-called aristocracy of wealth is unknown; good feeling and good taste are universal. The wealthy never make themselves vulgarly conspicuous by display. Intellectual culture may not be so thorough with the ladies as with gentlemen, but in the intercourse of daily life you would scarcely miss it. Their conversation and manners are gracious and graceful, and there is a beauty in their speech all permeated with the glory of their incomparable language. She may not always be beautiful in feature, but the musical voice is filled with a pathos and grace indescribable. The conversational tone appears as if cultivated by high art, since it is always musical and soothing; a Spanish lady's voice will fascinate when all other charms have failed. The dress of the ladies is after the latest Parisian fashion, and no more elegant costumes than theirs can be found. Gentlemen also follow Parisian style. Horseback-riding is the favorite out-door amusement for all. They are rapid and graceful riders. The roads leading through suburban towns and places of resort are good, many of them being hedged with rare and beautiful flowers, which load the atmosphere with rich perfume, and large parties of equestrians may daily be seen, dashing up and down these avenues, apparently as light-hearted and gay as happy children.

Shortly after my arrival at Bogota I was introduced to Don Pepi Paris, a gentleman who had held very close relations of friendship with Bolivar when he was President of Colombia. The emerald mines of Mozo, belonging to the government, had been a source of large revenue in former years, but at the time of which I speak were not sufficiently productive to be very profitable. General Bolivar, wishing to show a favor to Don Pepi, offered him these mines at a nominal rent, which offer was accepted. Work in the mines was commenced and continued several years, but the results were not satisfactory, and becoming embarrassed in his financial affairs, Don Pepi requested Bolivar to relieve him of his contract with the government. This Bolivar refused to do, insisting that he should make one more trial, and if not successful he would then release him. Bolivar had a strong presentiment that the emeralds would be found in abundance if the work was continued, and even suggested the direction in which

they should proceed. He induced Don Pepi to continue the work, and what was the result? Within one month they opened a vein of emeralds, and took out nearly three millions of dollars' worth.

Don Pepi possessed a suburban home of great beauty, which he presented to his friend and benefactor. Shortly after this event, some of the officers of the army conceived the idea of making Bolivar Dictator. In pursuance of their plans, arrangements were made for a grand dinner at this country seat. Invitations were given to the officers who were in the secret, Don Pepi being the only civilian thus honored, as it was well understood he was a devoted friend of Bolivar. The appointed day arrived, the guests assembled, took their places at table, and, after partaking of the dinner, were ready to complete their conspiracy. The toasts were first in order. A leading general requested those present to fill their glasses. The company rose to their feet, when he said: "Gentlemen, I propose the health of the President of Colombia—may he soon be proclaimed Dictator!" As the glasses were raised to drink, Don Pepi's voice was heard, and all turned towards the speaker. With flashing eyes, he proudly exclaimed: "When Bolivar becomes Dictator, may his blood flow as this wine!" and dashed it over his shoulder to the floor.

These fearless words crushed out the conspiracy then and there; and their ambitious hopes disappeared like the "baseless fabric of this vision." The patriot's voice snapped the nearly forged chains of slavery, and Colombia was free! Don Pepi loved Bolivar, but he loved his country more. After the "Great Liberator" had passed on to another sphere, Don Pepi went to Italy and superintended the casting of a bronze statue of Bolivar, which he had transported over the Andes and placed in the centre of the Grand Plaza of Bogota, where it stands to-day, a mute witness of the power and truth of holy friendship.

In the dark hour of our country's future, may she not want for men who will love her as Don Pepi loved Colombia!

I felt that I was especially fortunate, on going to this far-away land, in having letters of introduction to many of its most eminent citizens. Among them was one brave, noble woman, La Señora Cayetana Rodrigues, then nearly eighty years of age. She was respected by all; those of opposite political opinions being compelled to esteem her for her perfect integrity and peerless characteristics. She was known as "La Patriota," and deserved this distinction among so many of her loyal countrywomen. Shortly after my arrival, I received an invitation to dine at her house. The dinner was given in honor of President Lopez and his newly-chosen cabinet; he being the first successful candidate of the Liberal, which was opposed to that of the Church party. La Señora was a power to the former—one strongly relied upon; for, as we all know, woman can often assist a cause by words and examples of self-sacrifice, which outweigh deeds written in blood on the battle-field!

The occasion was a memorable one, for many reasons. It had a strong political significance, and the dinner was served with great state, on a complete service of gold! Afterward I learned a pathetic incident in the life of this noble woman, which seems like a tale from the "Arabian Nights" or some stirring, old-time romance. She had a son, who inherited from his mother a love of justice and liberty! He was detected in an effort to overthrow the then despotic government, and, after a hasty trial, was sentenced to be shot. His mother, frantic with grief, used every available means to save him, until it seemed as if even a mother's ingenuity had been exhausted, and nothing remained but an acceptance of the terrible fate of her child. But, after she had bidden him adieu in the purple twilight of the day preceding his intended execution, she resolved upon one more effort, again to humble herself before the highest officer



of the government her son had offended, and on her knees plead for his pardon! She threw herself at the officer's feet, and, with sobs and tears, pitifully begged for the life so dear to her. "Name a ransom," she said; "there must be something you desire more than this one human life!" Touched by her sorrow, and perhaps tired of her importunity, he replied: "Give me his weight in gold, and your plea shall be granted!" She rushed to her home, and soon upon the Plaza, the place appointed for his execution, lay a heap of the shining ore! Her son was brought forth, placed upon the scales; then the gold was piled up until that outweighed him, when, amidst the wildest excitement and tumult of pleasure of the surrounding spectators, she grasped him by the hand, and in loving triumph bore him away!

Standing on a range of hills east of Bogota, and looking southwest, you can see a solitary snowy mountain, Tolima, 19,000 feet high; and so near does it seem, that one fancies that to throw a stone upon it would be an easy matter; and yet it is one hundred miles away! Many years ago part of the icy dome detached itself and went crashing down the side of the mountain. In its track through the forest, mighty trees that had defied the storms of ages were cut off and swept before it, like grass before the mower's scythe. When it reached the warm country, the melted ice and snow had become a mighty river! Entire villages, and thousands of the inhabitants, were borne on the fearful tide and plunged into the Magdalena! The shadow of the cañon from which this vast body of ice and snow was hurled is yet distinctly visible, even by moonlight.

Cipaquirá, 65 miles from Bogota, is the great centre of salt production, which is sent from there to all parts of the republic. This trade is a government monopoly. A journey through the galleries of this salt-mountain, which has been worked many centuries, is intensely interesting, but we have not time to explore its mysteries to-night.

The emerald mines of Mozo are not the smallest wonders of this land of marvellous beauty. They are four days' journey from the capital, and said to be the only emerald-producing mines in the world. Time fails me, or I could tell you of the natural bridge of Pandi, and the Sumapaz, or "River of Great Peace," which flows so quietly under its rough, rocky arch, and in whose sweetish-tasting waters lignum-vitæ becomes a petrefaction in six months!

The Indians have a tradition that the Plain of Bogota was at one time the bed of a lake; and that the Great Spirit stretched his magic wand across the mountain barrier, tearing it asunder and pouring the waters of the lake into the abyss of Taquendama! As you look at the River of Bogota plunging into the gulf, you can scarcely resist yielding a belief to the old story. Baron Humboldt measured the Falls of Taquendama, and found them nearly 600 feet high.

The people of this ancient city are friendly and hospitable to foreigners; ever ready to show them attention and kindness. Once make yourself master of their language, and you find every house a home, where you are treated with a consideration most delicate. If one does not secure friends in Bogota, it will be because he does not deserve them.



AN ACCOUNT OF THE STATUE CALLED CHAC-MOOL, DISCOVERED  
IN YUCATAN BY DR. AUGUSTUS LE PLONGEON.

BY STEPHEN SALISBURY, JR.

At the semi-annual meeting of the American Antiquarian Society, held in Boston, April 26, a paper on this subject was presented by the writer, explanatory of photographs purchased from the agent of Dr. Le Plongeon, which were then exhibited, and descriptive of the pictures of an entire statue found at the mines of Chichen-Itza, Yucatan. Since that date, communications from Yucatan, in regard to this discovery, have been received, and the present article, containing this new matter, is offered to the American Geographical Society for their consideration, with the hope that the attention of archaeologists may be called to this discovery and to its connection with the early inhabitants of the continent, and also to direct notice to the labors of the indefatigable Dr. Le Plongeon in this field of inquiry.

The success attending the excavations of Dr. Schlieman in the Troad and at Mycenæ, and of M. di Cesnola at Cyprus, has been successfully emulated among the ruined palaces of the Mayas in the province of Yucatan. Dr. Augustus Le Plongeon, an archaeologist and an enthusiastic traveler, a native of the Island of Jersey, but of French parentage, has discovered an entire statue, which he has excavated (in 1875) from a depth of 30 feet in a building at Chichen-Itza, an ancient and ruined city of Yucatan, 108 miles south-southeast from Merida, the capital, and 20 miles west from Valladolid, the chief town of the eastern portion of the state.

The statue, as shown in my photographs, is cut from a solid block of stone (limestone probably), measuring a little more than nine feet in length, and weighing 12,500 to 15,000 pounds. It is of herculean proportions and of very superior workmanship, and represents a man reclining upon a pedestal apparently cut from the same block of stone as the figure. The attitude of the statue is commanding, and is suggestive of a degree of unrest, as if about to rise from its recumbent position. The knees of this figure are drawn up, and the elbows rest upon the pedestal. The face is turned and looks over the right shoulder, and the head is protected by a peculiar covering surrounding it like a fillet. The drapery of the body seems to consist of broad bands across the chest, upon the arms and just below the knees, and the feet are shod with sandals similar to those now worn by the Indians in that country. The face bears a strong likeness to a photograph of a face in bas-relief from the ruins of Texmal, but in most respects this statue differs from the previously discovered sculptures of the Yucatan peninsula, and it is regarded with great admiration and wonder by the people of that country. It does not resemble the idols which have been found there, which are draped with trappings and weapons, nor does it resemble the bas-reliefs nor the paintings, which depend more on costume than on skillful anatomical proportion for their effect; but it appears to be an independent construction, finished "in the round" in the same way that our sculptors represent the likenesses of living men. While the other sculptures present a partial view only by lines on a flat surface, or at most are in alto, basso or messo rilievo—the idols being almost the only sculptures finished "in the round,"

with generally a smooth and unfinished reverse—this statue appears complete in itself, courting examination upon all sides.

The statue of Chac-Mool, or "Tiger-king," as it is called by its discoverers and by common consent, was brought to the city of Merida on March 1 of this year; and an idea of the importance with which its discovery and acquisition was regarded by the inhabitants of that city, may be obtained from the following extract from an editorial article in the *Periodico Oficial* of March 2, 1875:

"Yesterday morning the statue of the Tiger-king Chac-Mool was brought to the city by the Commission which, under the orders of C. Juan Peon Contreras, Director of the Museo Yucateso, had been sent to search for it in the midst of the forests bordering upon the town of Pisté. The Governor-General, Protasio Guerra, presided over the occasion in an open carriage accompanied by the Counsellor of the State and the Political Judge. Next came the Commission in charge and their carriage was followed by many others and by a procession of citizens. The lyceums and the municipal schools also took part, and great satisfaction was occasioned by the spectacle of the children who came together to participate equally in this triumph of science. At the entrance of the colossal statue into the street of Porfirio Diaz, the military band played "The Hymn of the State." Compact lines of ladies and gentlemen occupied the two sidewalks of the street as far as the Central Park. As the statue passed before the Society "La Siempre Viva," Isabel Ciresol, a graduate of the Lyceum, recited a beautiful poem. Then the statue continued its triumphal passage, stopping in the middle of the street between the Park and the porch of the Catholic temple of Jesus, where it remained until the afternoon, when it was carried into the porch of this church for public exhibition until such time as it shall be placed in the position intended for it in the Museum. During the time that it remained in the street two addresses were made, and an ode suited to the occasion was recited.

"The statue of Chac-Mool measures a little more than nine feet in length. Its beautiful head is turned to one side in a menacing attitude, and it has a face of ferocious appearance. This precious object of antiquity is worthy of the study of thoughtful men. History and archaeology in their grave and profound investigations will certainly discover the secret which surrounds all the precious monuments which occupy the breadth of our rich soil, an evident proof of the ancient civilization of the Mayas now attracting the attention of the Old World. The entrance of the statue of Chac-Mool into the capital will form an epoch in the annals of Yucatan history."

A letter from Señor David Carases to the writer, dated Merida, March 8, contains the following allusion to this statue: "Now that we talk about antiquities, it is not amiss to tell you that Mr. Augustus Le Plongeon has been of late studying our ruins, and has recently found at a distance of 30 feet under ground, near one of the principal buildings of Chichen-Itza, a colossal statue of the Tiger-king (Chac-Mool in Maya), which statue is now in the Museo Yucateso. Such statues and of that size are very rare in our ruins, and I suppose this will be a fit subject for the study of antiquarians." The writer is in possession of a memorial on the subject of the discovery of the statue, written by C. Juan Peon Contreras, Director of the Museo Yucateso, and never before published. It is addressed to the Provisional Governor of the State of Yucatan, and is entitled: "A Short Historical Notice of the Stone Image Chac-Mool, Discovered in the Celebrated Ruins of Chichen-Itza, by the Learned Archaeologist Mr. Le Plongeon." The memorial notices the fact that the ruins of Chichen-Itza, 36 leagues from Merida, have been hitherto but little visited on account of their situation in a district occupied by hostile and revolutionary Indians (*Sublevados*), and that in the latter part of the year 1874, Dr. Le Plongeon and his wife fixed their residence there for some months, busying themselves with taking photographic views of whatever they found most worthy of notice. "They passed their days in producing exact plans and transferring to paper the wall-paintings that are still preserved upon some of the edifices, such as Acabib—signifying 'dark writings.'" Finally, Dr. Le Plongeon

became convinced that he was upon the eve of an important discovery, the exact particulars of which he will give when he publishes the interesting work which he is preparing about his scientific investigations in the ruins of Yucatan.

The discovery of the statue is thus detailed: "*Chac-Mool* is a Maya word, which means 'Tiger,' so the discoverer chose to name it, and he reserved to himself his reasons. He discovered an oblong, somewhat imperfect vase of stone, measuring 9 inches in thickness by  $27\frac{1}{2}$  inches in length and 34 inches in width. Above the vase reposes the colossal image in a single block of stone weighing 12,500–15,000 pounds. Its imposing and majestic attitude and the insignia which adorned it, lead to the supposition that it was some noble leader of the time—a king or noble. It was reached at a depth of 8 metres, not far from the manorial castle of Chichen. According to the discoverer, there exists a kind of mausoleum or monument erected to the memory of *Chac-Mool* by the queen, his wife, in which the statue was preserved, and at a short distance from this place was found a stone statue, representing a tiger,\* which, it is presumed, surmounted the mausoleum. By means of a trestle-work of trunks and limbs of trees, and employing a capstan, with ropes made from the bark of the grape-vine, Dr. Le Plongeon succeeded in lifting from its depository and landing upon the ground the most noteworthy archaeological treasure ever discovered in Yucatan. Ignorant of the laws of the country, this American traveler thought he might at once consider himself the owner of the statue, and succeeded, in 15 days, in bringing it as far as the uninhabited town of Pisté, two miles from the ruins, and there he concealed it while he might inform himself about his supposed rights; but the government of the state had, in the meantime, decided that the statue was the property of the nation and not of the discoverer. Thereupon Dr. Le Plongeon occupied himself in visiting other ruins, leaving for a better opportunity the question of ownership of the statue."

Señor Contreras then gives an account of his own agency in the recovery of the statue, in which he was assisted by an armed military force necessary for an expedition of a dangerous character. We left Merida on February 1, 1875, and opening a road six leagues in length over a surface covered with mounds and inequalities, and placing the statue upon a wagon, it was drawn by more than 150 Indians in relays. The natives, in their fanatical superstition, asserted that during the late hours of the night there came from the mouth of the figure the cries *Conex! Conex!* signifying in their language, "Let us go! let us go!"

"Upon the 26th of February the statue was received in the historical and monumental town of Izamal with enthusiastic demonstrations, and the speeches and poems offered on this occasion have been printed in the form of a pamphlet. When it arrived in Merida, a no less lively reception was accorded to it upon the 1st of March. Soon after, by decision of the Governor, the transfer of the statue to the National Museum at Mexico was permitted, with the understanding that a plaster copy of *Chac-Mool* should remain in the possession of the Museo Yucateso, which copy should be made by a skillful Yucatan artist. But the unexpected arrival and early return of the national war-steamer '*Libertad*,' sent by the government to bring the statue to Mexico by way of Vera Cruz, gave no time to secure this copy, and the request of the Museo Yucateso for such a copy will be presented to the President of the Republic as an inadequate substitute for the original."

The above memorial of Señor Contreras, and the public ceremonies which took place at the town of Izamal and in the city of Merida on the reception of this statue, testify the profound admiration with which this discovery of Dr. Le

\* In the collection of photographs from Chichen-Itza, taken by Dr. Le Plongeon, is a picture representing the stone statue of a tiger.

Plongeon is regarded by the scholars of Yucatan, accustomed all their lives to look upon the ruins of an earlier civilization covered with bas-reliefs, hieroglyphics and paintings.

A search for a description of an American statue which resembles that of Chac-Mool results in finding an account of two similar statues described by Bishop Diego de Landa, the second Bishop of Yucatan, which he saw at the ruins of Chichen-Itza. The account from which the extract below is taken is entitled "Relacion de las Choses de Yucatan," and was written in 1866. The manuscript was found by Brasseur de Bourbourg, at Madrid, and was copied by him from a copy of the original made 30 years after the death of Landa. Bishop Landa says: "I found there also two men cut in stone of a single piece, each of high stature, *en carnes cubierta en honestidad*, according to the usages of the Indians. They held their heads in a peculiar manner, with pendants hanging to their ears, which were inserted into a deep hole made on purpose after the usage of the country, forming a cluster behind the neck; and thus adorned, the statue was complete." Later explorers have failed to mention the existence of these statues, and it is probable that they have disappeared, while the original position of the statue of Chac-Mool, as shown in the photographs, would preclude the idea that this statue could have been buried to a depth of 30 feet after the Spanish invasion.

The attention of the writer was first called to this subject by the admirable annual address of Chief-Justice Daly, delivered on the 16th of January, in which he notices the labors of Dr. Le Plongeon, and also the valuable photographs of Yucatan ruins, which were for sale in New York. This collection of 125 photographs is now in possession of the writer and consists of portraits of Dr. Le Plongeon and his wife, eight photographs of specimen sculptures, seven photographs of the ruins of Aké, twelve photographs of Yucatan Indians, 60 photographs of the ruins of Uxmal, and 36 photographs of the ruins of Chichen-Itza, including twelve views relating to the discovery of the Chac-Mool statue. In addition to the above, relics, said to be taken from the excavation where the statue was found called the tomb of the chieftain Chac-Mool, are now in the possession of the writer, together with letters of Dr. Le Plongeon concerning the photographs, the discovery of the statue and of the relics. These relics consist of an ornamental urn of pottery and two dishes of the same material, flint arrow-heads of superior workmanship, and jade points of a peculiar form.

In the same collection of curiosities were fossil shells found in excavations, which may assist in determining the period when the ancient buildings were erected. Besides there were flint lance-tops and stone axes from the island of Cozumel.

Bishop Landa says in his *Relacion* (p. 199): "As to seigneurs and people of superior condition, they burn their remains and deposit their ashes in large urns. They build afterwards temples over them as one sees they anciently did by what is found at Izamal." Here there is ground for the belief that the statue of Chac-Mool was the representation of some Itza king or high dignitary, and that the building beneath which his statue was found was his tomb, where his ashes as well as his semblance found repose. The ruins of Chichen-Itza are first mentioned in the records of the expedition of the Adelantado Montijo,\* undertaken in the year 1527, for the conquest and purification of Yucatan. This place was then famous for its beautiful and strongly constructed buildings, which served both the natives and Spaniards as fortifications, and also for two large *senotas* or ponds which supplied the place with water. Landa says: "The Indians had as great veneration for Cozumel and the wells of Chichen-

\* *Historia de Yucatan*. By Diego Lopez de Cagolludo. Merida, 1815, p. 87.

Itza, as we have for pilgrimages to Jerusalem and to Rome." The original Maya name of this place has been retained to this day; *Chichen* meaning "mouth of wells," and *Itza* being the name of a branch of the Maya people, or of a royal family, which played a most important part in Yucatan history. This place was taken possession of and occupied by Montijo about this time; but it does not appear whether the town was inhabited by Indians at the time of its discovery. The Spaniards were forced, after a time, to give up the occupation of Chichen-Itza, to withdraw secretly by night from the place, and ultimately, in 1535, from Yucatan.

The probable locality where the statue of Chac-Mool was discovered by Dr. Le Plongeon is indicated, in the absence of any written description, by a comparison of his photographs with the engravings of buildings at Chichen-Itza, in Stephens' "Incidents of Travel in Yucatan,"\* and in Chomay's "Ruines Americaines." We find a picture of a ruin, called by Stephens the "gymnasium," by the natives the "church," and by Chomay the "circuit." Stephens says of the building: "It [the gymnasium] consists of two immense parallel walls, each 274 feet long, 30 feet thick, and 120 feet apart. [Here begins a description of the building where the statue was excavated.] At the southern extremity of the eastern wall, and on the outer side, stands the building [a picture of which he gives as a part of, and the southeast corner of, the easterly wall above-mentioned]. It consists of two ranges, one even with the ground, and the other about 25 feet above it, the latter being in a good state of preservation, simple, tasteful in its arrangements, and having conspicuous a procession of tigers or lynxes, which appear upon a small scale in the engraving. From its lofty position, with trees growing around it and on the roof, the effect is beautifully picturesque, and it has besides a far higher interest, and on some consideration may, perhaps, be regarded as the most important structure that we met within our whole exploration of ruins. The lower building standing on the ground is in a ruinous condition; the front has fallen in, and shows only the remains of two columns covered with sculptural figures. The fall of the front has laid bare the entire wall of the chamber, covered from one end to the other with elaborately sculptured figures in bas-relief. In the upper building is presented, though broken and disfigured, perhaps the greatest gem of aboriginal art, which on the whole continent of America now survives." This gem consists of a chamber, the walls of which are covered from the floor to the peak of the arch, with designs in painting, representing in vivid colors human figures, battles, houses, trees and scenes of domestic life, and conspicuous upon one side is a large canoe.

The photographs relating to Chac-Mool are a series of twelve pictures, six of which represent the statue in its various conditions from its situation in the deep excavation to the time when it was placed upon wheels for transportation, and they exhibit the engineering process by which it was lifted from its original bed. The other six photographs show the building where the statue was found, and the various sculptures and hieroglyphics connected with it. This series of twelve views was attached to a sheet of card-board labeled by Dr. Le Plongeon, "Chichen-Itza Ruins, Grand Discovery of Chac-Mool Statue." The locality cannot be mistaken, as, on comparison, it is found to agree in all respects with the picture of the building upon the southeast corner of the so-called gymnasium wall.

The following facts have been learned in regard to Dr. Augustus Le Plongeon, who is still occupied in scientific investigations in Yucatan, a region which Brasseur de Bourbourg wrote "appeared to him destined to return the

\* *Travels in Yucatan.* By John L. Stephens. New York, 1860. Vol. 11, pp. 303, 308.



greatest results to the historian and archaeologist of any part of America." Dr. Le Plongeon was born on the Island of Jersey, and was educated at Paris. He went to California in 1849, as an engineer, and there laid out the town of Marysville. Thence he went to Peru and traveled with Mr. Squier, acting as his photographer. Dr. Le Plongeon visited Yucatan in 1873, since which time he has been occupied in archæological studies and investigations there, and in exercising his skill as a photographer.

The letters of Dr. Le Plongeon are written in English, and are very interesting. One of his letters, dated Merida, Yucatan, August 30, 1876, is addressed to General Hawley, President of the Centennial Commission, and gives his reasons for not sending the statue of Chac-Mool to the Exhibition, as he had intended, which were, as we know, that he failed to obtain the permission of the government. He says: "I send photographs of the monuments of Chichen-Itza, Uxmal and Aké, also of the discovery of the greatest piece of sculpture ever known of ancient America; of the engineering work, executed without tools or machinery to extract it from the place where it laid buried at a depth of eight metres. I also send photographs of the bas-reliefs that once adorned Chac-Mool's sepulchre. These, I think, equal to those found by Layard, Botia, and others in the palaces of Kouyunjik (Nineveh) and Babylon. I also send pottery found in the mausoleum with ashes and some jade ornaments near the head of the statue in a heavy stone urn. Also two dozen arrow-heads used by the great chieftain Chac-Mool, whose history I read in the hieroglyphics and paintings. I sincerely hope that you will assign to these works, poor as they are, a place in the Exhibition, where they can be studied by the scientific men of all countries now in Philadelphia. Pray, in the name of science and history, tell them that it is no fault of mine, if I do not present them the originals instead of the photographs. The fact is the world has been deprived from admiring the beauties of ancient American art in a safe place out of all danger, to have them hidden yet by me in the depths of the forest. I feel really sorry not to have been able to present to your vision the material proof of the high civilization obtained by some of the inhabitants of America, and of Yucatan in particular. I also send you a small collection of interesting fossil shells. These are the only fossils of living beings found to the present day, that I know of, in the rocks of this peninsula."

A private letter from the same source to a friend in New York, dated Merida, October 31, 1876, has the following: "I returned from the wilds two months ago, after an absence of more than two years from the city of Merida. What I have done during that time in the woods, in deserted cities, surrounded on all sides by countless dangers, is more than I have time now to relate in a simple letter. An examination of my beautiful collection of photographs will tell you far more than I could do by words. Alice [his wife] and myself have worked like slaves. When, in December last, we discovered the greatest master-piece of statuary of ancient America, the great, the magnificent statue of Chac-Mool, an Itza king, we stretched every nerve to open roads through thick forests to bring it to a highway. We were fifteen miles from any village, in a place where the inhabitants of the country do not dare venture even in large numbers on account of the hostile Indians. Often we had nothing to eat, or perhaps only a hard corn pan-cake, yet we toiled day after day, and after raising my colossal statue to the surface of the earth from the deep bed where it laid at eight metres under the soil (see my memorial to the Mexican government), when I had already six miles of road, six metres broad, opened, the State government ordered my men to be disarmed. That, of course, stopped my work effectually. My boys and ourselves were left exposed to a sudden attack of the hostiles, and to be chopped to pieces by them, having no other means of defense than the cutlass. I was



then obliged to abandon my treasures in the woods when we were rejoicing at the thought of carrying them for the admiration of the world at Philadelphia. Well, seeing our hopes of carrying Chac-Mool to the Exhibition were blasted, we came to Merida, and then again worked—yes, worked day and night—to send at least our photographs. In a day or two I start for another somewhat hazardous expedition. Next you may hear from me from the Island of Maugeres, or, perhaps, Belize.”

Neither the photographs nor the relics of which Dr. Le Plongeon speaks were exhibited at Philadelphia, because their delivery was too long delayed. The statue of Chac-Mool is now probably in the National Museum of Mexico.

Another interesting letter is dated Isla de Maugeres, coast of Yucatan, December 12, 1876. It gives an account of the antiquities of that island, and adds: “I hope soon to be able to publish some photographs, plans and notes unknown to historians as yet. The work I have undertaken is far from being accomplished; I have done much; I have yet more to do.”

Unless a great fraud has been practiced, the discovery of the statue of Chac-Mool is worthy of the enthusiastic reception which has been accorded to it in Yucatan. It is with the hope, that, by attracting public attention to his discovery, others may be induced to co-operate with Dr. Le Plongeon in his archaeological investigations, that the writer has been led into this detailed account of his severe and long-continued scientific labors.

## PRACTICAL HINTS FOR ARCTIC TRAVELING.

[A LETTER TO THE PRESIDENT OF THE SOCIETY.]

I am delighted to see, by the newspapers, that there is a probability of the United States government prosecuting Arctic research via Smith sound, a line of route specially American, and made famous by the explorations of Kane, Hayes and Hall, who, with their comparatively ill-equipped and small expeditions, did such noble work; the latter, indeed, having taken his vessel, the "Polaris," within a few miles as far north as the point reached by the English ship "Alert," in the expedition of 1875 and '76, which, notwithstanding all its bolstering up by some able writers, was a failure, if we compare the work done with the programme laid down for its accomplishment.

Having had some experience of sledging, on several very long journeys on the Arctic coast, at an average daily rate of from eighteen to twenty-four miles, and a great deal of practice in snow-shoe walking during a twenty years' residence in the Hudson's Bay Company's territories, perhaps you will permit me to offer a few remarks upon those points where I think the recent English expedition made mistakes, which, although apparently slight individually, amount to a good deal in the aggregate.

In the first place, the men employed on the Narces expedition were, with few exceptions, habituated to a daily ration of grog at or near mid-day, this ration having been doubled for five months of winter, while the men had comparatively little work, except merely walking up and down for a few hours, and hauling ice for water, which was not sufficient to keep their muscles in proper condition for the laborious work of sledge-hauling.

They had a regular allowance of lime-juice on board the ship, which was doubled in quantity for some time before the sledge traveling began, when it was discontinued altogether. Their diet was suddenly changed from the ship-allowance of preserved meat, corned beef and pork, with six ounces of preserved vegetables, pickles and fruit, one ounce of lime-juice, with one gill of rum, to a sledging-ration of pemican-cured bacon, two ounces of preserved potato, one-half a gill of rum, and *no* lime-juice. (See inclosed scales of diet.)

The sledges, with runners about eight inches high and three inches broad, used by the recent expedition, were very objectionable, as they sank deep in snow unless it was very hard packed, and when descending from a hummock of ice, the forepart dove deep into the snow below, giving immense labor to pull and lift it out—labor which the men say was like tearing their arms off.

The best sledge is one resembling the Indian toboggan, but much larger, so as to carry 800, 1,200 or 1,600 pounds, if required, with three runners rounded at the edges, not more than  $2\frac{1}{2}$  or three inches broad, and about three-fourths of an inch deep, shod with steel. I consider the best size is a sledge holding about 800 pounds, or a load for four men; because if very difficult ice is to be got over, sledges of this size are much more easily handled, and do not require to be unloaded so often, if at all. The advantages of such a sledge are, that while it runs equally well as the sledge with high runners on the ice or hard snow, it cannot sink more than an inch or so in snow that is not hard packed, and cannot stick when coming down a hummock. It should be made of very tough, light wood, not more than  $\frac{1}{2}$  inch thick. Inside the turned-up head is a safe

place for instruments, tins, etc. The runners should be lined with tough steel. I consider that two sledges of four men each are better than one sledge of eight men, for they are much more handy among rough ice or soft snow, and can be moved by the two crews combined without unloading.

The English took chocolate or cocoa for breakfast; a very bad thing, tea being much better, as it keeps away thirst. They stopped about  $1\frac{1}{2}$  hours in the middle of each day's journey, to make tea; a mistake which should be avoided, as the men must get very much chilled after perspiring freely. I and my men never stopped longer than three or five minutes at a time, particularly if the weather was cold, during the whole ten or more hours we were traveling, only eating occasionally a mouthful of pemican or a bit of fat. If, however, this plan (which I have always found best) does not suit those who are accustomed to dine about mid-day, let them use extract of tea, by which at least one-half the time of stoppage may be saved, because the water need not be boiled, but merely brought to a sufficient heat to be pleasant to drink.

The English sledge-men used for bedding not only a heavy coverlid, but a duffle-bag for each man, and they also put on a thick duffle "jumper" before going to bed; thus the arms were separated from the body by *two folds* of a thick non-conductor, and each man was kept apart from his neighbor by *four-fold* of this material, so that heat could not be communicated from one to the other. In my own case, we had one covering for all five, with a strip of thin, hairy deer-skin between us and the snow on which we lay. We *took off* our coats, placing them either over or under us, according to taste, and lay as close as we could comfortably pack—I always being one of the outsides, and the cook for the time being, the other. If one of the outsides felt a little cold, the whole party put "about ship," as a sailor would say; that is, turned over on the other side, and thus the part of the body that was previously cold got the warm berth. I may say that I never was uncomfortably cold but once, and that was when the snow-house was made too small, and we had to shove our legs outside. Our whole bedding for five persons weighed between 24 and 25 pounds, or less than five pounds each.

Tents were used on the recent expedition, and are the worst kind of shelter for arctic service, being not only very cold, but having the disadvantage that nearly all the condensed breath and vapor from the hot food adheres to them, not only making the tent heavy and unpleasant to handle, but the least shake causes this condensed vapor to fall down upon the bedding, into which, and if great care is not used, it gets impacted, and aids materially in making it of that "sheet-iron" consistence spoken of by Captain Markham at the meeting of our Geographical Society.

Snow huts are the best shelter in any temperature from  $10^{\circ}$  below the freezing point to  $70^{\circ}$  below zero; and if these cannot be built, either from men not knowing how to do so, or because the snow is not sufficiently packed, snow walls should be run up, which is not hard work if properly set about. These walls may be of any thickness most convenient, and should slope inwards as much as possible; should be five or six feet high, counting the depth of space hollowed out by removal of snow for the walls. A piece of sheeting has generally been used as a roof; I should prefer a double fold of thin but strong linen, having between the folds a thin layer of bird's down, which would make this kind of shelter nearly as warm as a true snow hut, which I and my men never failed in building.

Snow-shoes should also be taken on every arctic expedition, and would have been of great use in the recent one, although the officers are not willing to allow as much; at least Sir George Nares has said that heavily loaded sledges cannot be hauled by men with snow-shoes on. In fact, the gallant knight knows noth-

ing about it, probably never having in his life seen a sledge so hauled, yet he gives his opinion with as much confidence as if he had great experience. The snow-shoe best adapted for arctic work should be short, and broad in proportion. There should be different sizes to suit the different weights of the men.

Should it be requisite to build boats to be hauled over the ice, they should be made much broader in proportion to their length than those I have seen.

As regards the sledge-journey poleward, I can only say that it is no wonder little progress was made with the unnecessarily heavy loads\* that were dragged by men suffering from scurvy, who, in their weakened state, must have found great difficulty in surmounting obstacles which to healthy and experienced men would have been easy.

There seems, at least, one weak point in Sir George Nares' statement, to the effect that there is no getting a ship nearer the pole, via Smith sound, than the point reached by the "Alert." As early as the 31st of July, 1876, a strong southwest wind drove the ice-pack out to sea to the northeast, and enabled the "Alert" to round Cape Rawson, and run ten miles southward through a fairly open channel until stopped by a heavy floe (*floeberg*)  $1\frac{1}{2}$  miles in diameter, which moved off next day northward "with the tide, at the rate of  $1\frac{1}{2}$  miles an hour." (See *Nature*, Nov. 9, 1876, p. 43.) The question to be asked is: Where did all this 10 or 12 miles of ice and great floeberg go to? As the ships went northward, the immense fields of ice 100 feet or more thick, to the north, must also have been moving in that direction to make room, otherwise we cannot account for so large a space of open water appearing so suddenly. Probably a day or two of southerly wind might, a few weeks later, have driven the immense piles of palæocristic ice many miles away, and left a clear passage to the north even for ships. At Repulse bay, lat. 66°, long. 32° N., in 1847, the ice did not clear away sufficiently to allow my boats to get along shore until the 12th of August! It is also probable that the great ridges of ice that looked so formidable, and were so unsurmountable to scurvy-stricken men, with their heavily laden sledges, did not extend very far northward beyond the lat. 83°, long. 20° 26' N., reached, or only 25 miles north of the land at Cape Hecla.

I would recommend that no grog be given as an allowance, either on board ship or on the sledging; that men should be chosen who had not been accustomed to a regular ration daily of grog; that a few men should be taken as travelers, who had been used to snow-shoe walking, sledge traveling, setting nets under ice, etc. Such men ought to be got, I think, at Winnipeg, among the English half-breeds there, who are as fine fellows as a person could wish for such work as I have named; but probably equally good men may be found in the United States among the western trappers. We hear of naval discipline being necessary in arctic service. I deny this *in toto*. No men could have been more obedient than the men of various nationalities I had on three occasions under me; the cheerfulness with which they did an immense deal of hard work, would have surprised most people, and this, too, without a word of bad language or an oath that could have offended the most delicate lady.

During winter, whenever practicable, the men should be exercised in snow-shoe walking, snow-hut and snow-shelter building; and, if a lake is near, in setting nets under the ice, or perhaps in the sea if there are signs of fish; also in sledge hauling to a sufficient extent to accustom the leg muscles to this particular kind of work. For sometime before starting on the sledge-journeys, the men should in some degree be made accustomed to the sledging diet so as to discover if it agreed with them, although they could not be expected to eat it so readily on board ship as when traveling.

\* After the auxiliary sledge returned, loads were more than 400 pounds per man.

The clothes used by the English expedition were much too heavy and woolly outside, not keeping out the wind sufficiently. The best coat, in my opinion, is one made of close but not heavy beaver-teen, or of thin leather lined with stout flannel, or bath-coating, with as much woolen clothing underneath as a man may, by winter experience, find requisite for comfort. Moccasins made of good moose-skin I consider best for long journeys, with cross-pieces sewed on to prevent slipping. In early winter something water-proof is best, and Eskimo boots are not bad.

I could add a good deal more, but think I have said enough for the present. If there happens to be only one or two of the suggestions I have named thought worthy of adoption, I shall feel myself amply repaid for troubling you with this long and hurriedly written letter. I append some tables of information in compact form.

Believe me, truly yours,

JOHN W. RAE.

### SCALE OF DIET USED ON THE ENGLISH ARCTIC EXPEDITION, 1875-6.

[Copied from the printed official reports, signed by G. S. Nares, Captain R. N.]

#### ON BOARD SHIP—Rations per man per day.

|  |   |
|--|---|
| 1 lb. biscuit or soft bread.   | 1 oz. chocolate.  |
| $\frac{1}{2}$ gill spirits (doubled for the five months of sun's absence).                           | $\frac{1}{2}$ oz. tea.                                    |
| * $\frac{3}{4}$ lb. preserved meat, and $\frac{1}{2}$ lb. potted soup, or 1 lb. corned beef or pork. | $2\frac{3}{4}$ ozs. sugar.                                |
| $\frac{1}{4}$ lb. preserved vegetables.  | 1 oz. lime-juice (doubled for some time before sledging). |
|  | 1 oz. pickles.  |

#### For each man per week.

|  |   |
|--|---|
| Nearly $1\frac{1}{2}$ lbs. flour, suet and currants. | $\frac{1}{2}$ oz. mustard.  |
| Nearly $\frac{1}{2}$ lb. split peas.                 | $\frac{1}{2}$ oz. pepper.   |
| Nearly $\frac{1}{2}$ lb. compressed vegetables.      | Celery seed, vinegar, oatmeal and salt as may be found necessary. |
| $\frac{1}{4}$ lb. fruit.                             |   |
| $1\frac{1}{2}$ ozs. sugar.                           |   |

#### SLEDGING—Ration per man per day.

|                          |   |
|--------------------------|---|
| 14 ozs. biscuit.         | $\frac{1}{2}$ oz. tobacco.                  |
| $\frac{1}{2}$ gill rum.  | $\frac{1}{2}$ oz. salt.                     |
| 1 lb. pemican.           | 1-20 oz. of pepper.                         |
| $\frac{1}{4}$ lb. bacon. | $\frac{1}{4}$ oz. onion and celery powders. |
| 1 oz. chocolate.         | 2 ozs. preserved potato.                    |
| 2 ozs. sugar.            | 3 ozs. stearine,                            |
| $\frac{1}{2}$ oz. tea.   | 1 oz. spirit of wine, } for fuel.           |

It will be observed, that when the men were put on the rich, fat food of pemican and bacon, and to very hard work, their lime-juice was discontinued, and they had only 2 ounces of preserved potato instead of 6 ounces of preserved vegetables, pickles and fruit a day.

#### SCALE OF SLEDGING RATIONS PROPOSED BY JOHN RAE.

- $1\frac{1}{2}$  lbs. pemican.
- $\frac{3}{4}$  lb. biscuit.
- 3-16 lb. preserved potato or other vegetable.

\* Preserved meat and soup issued four days a week.



$\frac{1}{8}$  lb. condensed milk.

$\frac{1}{8}$  lb. preserved cranberries—not much sugar.

Rum, none.

$\frac{1}{4}$  oz. tea.

A small quantity extract of tea most useful, as the water need not boil.

$\frac{3}{4}$  oz. chocolate.

2 ozs. sugar for all purposes.

\* 1 oz. lime-juice; onion and celery powder, pepper, etc., if thought requisite.

3 ozs. stearine and 1 oz. alcohol per man for fuel.

The above scale of rations, except that it is much more ample, resembles nearly that used by my small party in 1854. As we had lived during winter wholly on fresh meat killed by ourselves, we required no lime-juice, and carried no vegetables or cranberries—only two ounces of potatoes.

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\* This might be carried in flat, tin flasks to hold about three or four days' rations of lime-juice for eight men; they could be placed over the kettle when cooking was going on, which would afford sufficient lime-juice for use each day. The flasks could be thrown away when empty. The lime-juice should be stowed in the ship in jars or casks.

## OCEANIC CURRENT CIRCULATION.

[ A LETTER TO THE PRESIDENT OF THE SOCIETY. ]

DEAR SIR—Knowing the great interest that you feel in everything pertaining to physical geography, I am sure you will pardon the great liberty I take in addressing you on a subject that, in my opinion, is of the most vital importance at the present day; for if we are ever to arrive at just and true conclusions in the science of meteorology, it seems to me that we must begin at the beginning, and as the currents of the air are so dependent, as we know them to be, on the currents of the ocean, a solution of the original momentum of oceanic current circulation seems to me to strike at the very root of the matter. Once settle that moot-point, and it is probable that a thousand questions now pending may be easy of solution.

Oceanic current circulation has for many years past been a subject that has occupied the attention of some of the most learned men of the day, and so varied have been the opinions on the matter, that it would take a volume to give but a passing glance at each theory as it has been laid before the public. I believe I have read most of the treatises of these authors, but I must say that my views differ so much from theirs, and I seem to have such a faint perception of the meaning of some of their propositions, that I can only come to the conclusion that they are not intended for men of ordinary faculties like myself. Some are so abstruse in their reasoning, that I invariably find myself "out of soundings" before I have got half through, and the fog of a November day in London could not be more impenetrable. It has suggested itself to me to have a word to say on this subject, for I cannot help thinking that a little practical experience is worth a world of theory; what I have to state is simply facts, gained from an experience of twenty-seven years as a sea-faring man.

No sailor, before the days of steam, ever contemplated a passage to the westward round either Cape Horn, Cape of Good Hope, or Cape Lewin, in Australia, without a species of repugnance, for it meant great bodily suffering, wet clothes by day, wet bedding at night. Day after day when the reckoning has been obtained, it has frequently been found that, instead of making progress, the ship is actually to leeward of her position on the preceding day; winds and currents in these latitudes seem as if designed to break down the courage and patience of the stoutest heart! I look back myself to my early sea-faring days, with a species of shudder, when I think of all that it cost in bodily suffering to gain "an offing" of any of these great southern promontories. The question naturally arises, what is the cause of all this? The answer is simple; the winds and the currents in the Antarctic are from everlasting to everlasting from the westward.

Take a globe and turn the south pole uppermost, and you will see before you a hemisphere nine-tenths of which is water, and between the fifty-fifth and sixty-fifth parallels of latitude no land intervenes to break the circle; in fact, you have here a perfect zone of water around the whole circumference of the globe, about 600 miles wide at its narrowest part, by an average of two miles deep. It is on this circle that I base my theory. The earth, in its diurnal revolution of nearly a thousand miles an hour from west to east, causes the water on this circle to flow at a speed slightly in excess of itself; for it is a well-known fact that water placed on a rotating surface will be thrown from the center to the periphery; so with the waters of the Antarctic—they are thrown from an un-

known center at the south pole, towards the equator; and I am firmly under the impression that were there no land whatever in the southern hemisphere, so great would the speed become as it neared the equator, that every drop of water on the surface of the earth would be thrown into space. As it is, the space between Cape Horn and the Antarctic continent acts as a safety-valve, to govern the mechanical motion of the currents of the ocean. Make that passage wider, and you would increase, proportionately, the flow of all these currents; stop it, by raising the continent of South America out of the water and joining it to the Antarctic continent, and at once you paralyze the whole system of current circulation, for this circle bears the same relation in the momentum of the currents of the ocean that the crank does to the steam-engine; it gives (if I may so term it) the necessary swing to the waters on this circle, that provides the power to propel them to the uttermost regions of the earth.

Now, let us see how existing data, taken from charts prepared by the first hydrographers of the day, carry out this theory. You will observe that on the circle that I have described, all arrows point eastward; but on coming in contact with the Horn, the Hope and the Lewin, they are split — one-half flowing eastward (the great arterial current), the other half (the deflecting current) flowing northward. Now, let us follow up one of these deflecting currents, and, as so much has been said of the Gulf Stream and its origin, let us see if this theory will not give a reasonable solution of that vexed question. As soon as the waters of this grand arterial current on the circle have passed the Horn, they open out, fan-shaped, as all water does after it has passed a barrier, and the barrier in this case is the comparatively narrow space between the Horn and the Antarctic continent. The northern portion of the current flows northeast, and, impinging on the western coast of Africa, flows directly northward at a velocity of nearly three miles an hour, until the contour of the land on the coast of Guinea gives it a westerly direction; the whole mass of water is then shot right over to the northeastern coast of South America, following the land through the Caribbean sea into the Gulf of Mexico, and so out in the Atlantic by the Gulf Stream. From my own personal observations along the whole of the west coast of Africa, from the Cape of Good Hope on the south to Cape Palmas on the north, and from Cape St. Roque, in South America, to the entrance of the Amazon, I speak advisedly, and without fear of contradiction, when I say that the whole of the currents along these coasts flow as I have described, at a speed, at several different points, of from three to four miles an hour. Independent of the original momentum given to these currents by the earth's rotation, it is very much augmented by evaporation in the tropics, together with the everlasting westerly winds blowing in the Antarctic, and, consequently, the volume of water passing out by the way of the Gulf Stream is small compared with that passing the Falkland islands on its way north.

The same rule holds good on the western coast of America, and the western coast of Australia. The cold waters of the Antarctic are sent north to cool the heated regions of the tropics. These are all surface-currents, as has been fully proved by the recent discoveries of H. M. S. "Challenger;" underneath them are sub-currents, running in nearly an opposite direction, for on the western side of both the Atlantic and Pacific oceans, we see the arrows nearly all pointing southward. Begin at Smith's sound, in the Arctic regions, and until you reach the Gulf Stream on the coast of Florida, all arrows point southward; but at this point the specific gravity of the water being so much greater than that of the water proceeding from the Gulf of Mexico (because so much colder), the former currents pass right under the latter to cross out again on the eastern coast of South America, where once more all arrows point southward; this, too, I know from actual experience, for no more disagreeable task could be assigned

any man than that of having to beat a ship from Rio de Janerio to Pernambuco in the months of December and January, when all winds and currents seem to stick to one point—*i. e.*, northeast. Light head-winds and strong head-currents, register facts of this description indelibly on a man's memory, as all experience gained by suffering does.

The great point to be settled is this—what is the original motion that sets all these currents running? Would the westerly winds in the Antaretic do it, unassisted by any other power? I, for one, do not think so; and for the same reason as was given by Maury, in his controversy with Dr. Carpenter on the subject, when he says, that “if wind has such a powerful influence in moving vast bodies of water, how is it that the sea-weed in the Sargasso sea retains its position from age to age, although traversed by the powerful northeast trade-winds? Solid substances floating on the surface of the water must perforce be moved more readily than water itself; still, where water has a tendency from other causes to move in a given direction, it may be easily imagined that wind might materially assist it, when constant in its direction.” The evaporation theory of Maury I cannot entertain for one moment, as being the sole cause of the movement, for were such the case, would it not be likely that all currents would tend from the poles towards the equator in an equal proportion? The theory lately set forward by Dr. Carpenter, I do not understand, so I will not attempt to controvert it, but I would conclude by saying, that if the Council of the Geographical Society of America will investigate this matter, taking my humble experience in connection with the data provided by the first hydrographers of the age, they will see a harmonious combination of facts upon which to base an opinion of this vexed question.

In conclusion I would remark that Humboldt, when writing on this subject, said “that the secret of the momentum of the currents of the ocean would be found south of the Cape of Good Hope.”

I am, dear sir, your obedient servant,

THOMAS LEATHAM.

NEW YORK, May 4, 1876.

## REPORT OF COL. H. G. PROUT ON HIS RECONNAISSANCE FROM KHARTOUM TO EL OBEIYAD.

[TRANSLATED FROM LE MONITEUR EGYPTIEN OF SEPT. 19 AND 20, 1875.]

WAR OFFICE, BUREAU OF GENERAL STAFF, }  
OFFICE OF THE CHIEF OF STAFF, CAIRO, EGYPT. }

The following report has been received at the war office:

On May 20, 1875, at 4:45 p. m., with my detachment and a caravan of forty-four camels, I left Om Dourman, the entrepôt of Khartoum. From that time I marched thirteen consecutive days to Khoorsi, six days along the western bank of the White Nile, and seven days west-southwest across country. Of thirteen camps which I made but three were dry and one of these three might have been made at wells, had I chosen to march the caravan nine hours and a-half instead of seven and a-half. The actual marching hours of the caravan from Khartoum to Khoorsi were  $89\frac{1}{2}$ , which, in thirteen days, gives an average of six hours and 53 minutes a day. The distance from Khoorsi to El Obeiyad is about 69 kilometres; that is to say two days of  $9\frac{1}{2}$  hours of marching for a caravan.

[Here follows a tabular statement of the hours of march from camp to camp; also a detailed account of the distribution and characteristics of about 50 wells on the route after leaving the Nile. The last is summed up in the following paragraph.]

From the Nile to El Obeiyad may be found water enough for the actual needs of the route and by digging other wells the water-supply could be considerably increased; but as the wells are generally from 100 to 160 feet deep, the labor in drawing water from them is enormous, and much time is necessary to supply a large party. More valuable results could be obtained in adopting some good mechanical arrangement for raising the water, than in digging more wells. Abundant pasturage for camels exists throughout the whole route from Om Dourman to El Obeiyad; and in its present condition the entire route is quite practical for wheeled vehicles. The first carriages which pass over it should be provided with picks, shovels and axes in order to level the banks of an occasional dry water-course, and to cut a few small trees in the forest of Hasehaba. No other work need be done. A railroad could very easily be constructed here. It would require almost no other earthwork than that necessary for drainage. Within a few kilometres of the line fuel for locomotives could be obtained for several years.

From Om Dourman to Tira-el-Hadra (the point where the route leaves the Nile) on the western bank of the river, is a belt of alluvial soil one to six kilometres in width, which is evidently inundated during the high Nile. Back of this is a narrow slope of gravel, which is limited at from three to ten kilometres from the river by low hills; what is west of these hills, whether sandy desert or grassy upland, I cannot say. This strip of alluvium increases in width as one goes south. It seems very fertile, but is not carefully cultivated. When I passed it was not the season of crops, but I saw occasional traces of cotton, more often of *dura* [a sort of millet which seems to be cultivated from Alexandria to the Cape of Good Hope]. Such cotton as I saw had a short, coarse fibre. Here are 800 square kilometres of fertile land, easily watered by short canals, which for want of systematic and organized labor produces but a bare subsistence for a scanty

and savage population. Large herds of fine-looking cattle, and flocks of goats and a few sheep graze in the western hills, and the people are quite wealthy in asses. Everywhere in this region one sees gum-producing acacias, in scattered groups or in low forests, while from time to time one finds groves of magnificent acacias. Villages (*hellas*) are numerous, particularly in the southern half of the route. They are universally huts of dura stalks and herbage, built either in the form of the well-known conical *tokel* or oftener in low small parallelograms.

At Tira-el-Hadra the route finally leaves the Nile, turning west-southwest across the upland. Here, at six kilometres from the Nile, is a permanent lake about two kilometres long and one kilometre wide, and apparently quite shallow. [It will be noticed that the writer does not claim this as a Nile source.] Trees and small islands of land-vegetation are seen in all parts of the lake; I should judge it to be water infiltrated from the Nile, though it evidently receives a contribution directly from the overflow during the high Nile. [Only in Africa would such a pond attract a moment's notice; in Africa water is water.] Here are numerous villages and the usual cultivation of dura and a little cotton. Westward from this point one passes at once into a region uniform in its general aspect from the Nile to El Obeiyad. It is a region of wide undulating plains, covered at this season with long brown grass, and dotted with groups and forests of leafless acacias, in which lurk guinea-fowl and gazelles. At intervals these grassy plains give place to a bare surface of light sandy soil, cultivated during the rains in *dokhu* [a grain much resembling in appearance the cat-tail rush of American swamps, and thriving with extremely little moisture]. Here are found villages of tokels, with wells from 30 to 50 metres deep, where are grouped herds of cattle, sheep and goats.

The agriculture in this region is in the rudest state. As the *kh-rif* (rainy season) begins, the ground is cleared of dry herbage, the seed is dropped into holes in the soil and covered over, and nature does the rest. The only crop of any importance is *dokhu*. At times one sees a little cotton, and occasionally a particularly thrifty sheik cultivates a patch of *melochiëh* or *bamiëh*. [*Melochiëh* is a sort of spinach, *bamiëh* is the okra of the United States. These are very important items in the food of all classes in Egypt, and, perhaps, wherever the Arabs have penetrated. The *bamiëh* is dried, and thus preserved throughout the year.] The want of water must forever forbid any progress worth mentioning in the agriculture of this whole region. It is impossible to cultivate anything which will grow and ripen during the three or four rainy months; and even the annual rains are much less certain in quantity and duration than is generally supposed. This want of water must limit, also, the grazing capacity of the country, as herds can never range far from the wells.

The product of gum ought to be considerable, and the red stains of the earth and sand indicate the general presence of iron. About 40 kilometres east of Khoorsi a mine of iron is now worked. The ore (brown hematite) is found in small, irregular pieces imbedded in the sand at a depth of three or four metres.

I hope to be able to collect somewhat accurate statistics of the population and products of this region for a general report on Kardofan.

I arrived at Khoorsi, about 60 kilometres northwest of El Obeiyad, the 1st of June. There I received a letter from Colonel Calston telling me of his extreme illness, and I immediately joined him. Shortly afterwards I took command of his expedition, with which I arrived at El Obeiyad on the 12th of June, 1875. My work subsequent to June 1, will, therefore, form a part of the general report of the operations during the reconnaissance in Kardofan.

H. G. PROUT,

Colonel of Engineers.



